# WOODLAND TREES

FRANCIS GEORGE HEATH

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To Madge

from Stan.

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Christmas 1913.

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# BRITISH WOODLAND TREES

# OF BOOKS BY FRANCIS GEORGE HEATH

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1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

PLATE V.—Photographs.

1. Acacia.
2. Black Poplar.
3. Grey Poplar.
4. White Poplar.
5. Aspen.
6. White Willow.
7. Weeping Willow.
8. Birch.
9. Alder.
10. Hawthorn.
11. Blackthorn.
12. Bullthorn.
13. Alder Buckthorn.
14. Dogwood.
15. Elder.
16. Box.

PLATE V.—*Frontispiece.*

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BY

FRANCIS GEORGE HEATH

EDITOR OF THE
NEW EDITION OF GILPIN'S 'FOREST SCENERY'
AUTHOR OF
'TREE LORE,' 'THE FERN PARADISE,' 'TREE GOSSIP,' 'THE FERN WORLD,'
'AUTUMNAL LEAVES,' 'SYLVAN WINTER,' 'SYLVAN SPRING,' 'BRITISH FERNS,'
'MY GARDEN WILD,' 'BRITISH RURAL LIFE AND LABOUR,'
'FAIRY PLANTS'—A FERN BOOK FOR CHILDREN, 'BURNHAM BEECHES,'
'GARDEN ROCKERY,' 'BRITISH FERN VARIETIES,' 'NERVATION OF PLANTS,'
'THE BRITISH CIVIL SERVICE,' ETC., ETC.

**With 8 coloured Plates**

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*Published 1913*

# PREFACE.

THIRTY-FIVE years ago I published a book which I dedicated 'To all lovers of Nature.' It was called *Our Woodland Trees*, and consisted of four parts: (1) 'The Life of a Tree'; (2) 'Some Woodland Rambles'; (3) 'Trees at Home'; and (4) 'British Woodland Trees.' The volume has been hopelessly 'out of print' for many years, and the solitary copy I have, besides the publishers' 'file copy,' is one I obtained, some years ago, as the sole result of advertising for it amongst all 'new' and 'second-hand' booksellers in the United Kingdom. The publication I advertised in[1] is distributed all over the English-speaking world amongst publishers and booksellers; and

[1] *The Publishers' Circular.*

although *Our Woodland Trees*, published at the comparatively high price of 12*s.* 6*d.*, was sold largely all over the world, the result was, nevertheless, the 'report' to me of only one second-hand copy.

Although repeatedly urged to produce a further edition, I have hitherto neglected to do so; but I have now decided to comply with oft-expressed wishes, and thus enable its practical and useful, and quite up-to-date, Parts I. and IV. to be issued, with 8 coloured plates—including sixty figures—representing the leaves of our British Woodland Trees.

The coloured plates are indeed the principal feature of the book. I can praise them, because all I did to promote their production was to collect the leaves myself and to insist that the colour-printing art should be used to make them, as nearly as art can possibly approach Nature, facsimiles of the leaves themselves. The greatest care was taken that the chromolithographic artist should copy, in minute detail, not only the exact outline of each leaf given him, but the whole of the interior tracery—

the exquisitely-beautiful venation, or system of veins.

No two leaves, in differing species of Trees, are alike in this respect. It is this difference that gives individual *character* to the leaves of each species. How Nature works to produce this exquisite and endless variation in the foliage of plants is one of its profound mysteries. We cannot understand it: we can only bow in reverential awe before the Divine Moulder of all things beautiful, produced by Him for our use and enjoyment.

It is rather surprising, perhaps, but it is nevertheless the fact, that in no other coloured illustrations of foliage—except in my own *Autumnal Leaves*—has any attempt been made to give to them the life-like appearance of facsimiles. Flattering expressions of gratification as to those in *Our Woodland Trees* have reached me both from readers at home and from abroad. From Melbourne came one from the assistant Editor of a great Australian paper, who wrote me that he had dreamed, as of an impossible delight, that some expert should

produce such leaves, and that his dream was realised by the plates in *Our Woodland Trees.* Another correspondent, writing from Ohio, said that whilst reading it and looking over the coloured engravings, so true to Nature, he felt as if he were back in the dear Old Land, 'roaming through its field paths, and crossing the old rustic stiles; then, through its quiet lanes with their leafy hedges of blackthorn in full bloom, and later of hawthorn.'

Trees have been aptly and beautifully described by a charming writer—in *The Trees of Old England*—as 'the buildings of God.' It will be fulfilling a purpose of high educational importance—especially to the young—to instil into the mind any impression of beauty; and in all nature there is nothing more beautiful than the exquisite fabric of a leaf.

My highest aim, therefore, will be accomplished if, from a study of *British Woodland Trees*, the heart be lifted in reverent adoration to the Divine Being who has showered upon us such a wealth of loveliness.

FRANCIS GEORGE HEATH.

*February*, 1913.

# CONTENTS.

## PART I.

### THE LIFE OF A TREE.


| CHAPTER | | PAGE |
|---|---|---|
| I. | Introductory | 8 |
| II. | The Tree Germ | 19 |
| III. | Early Growth | 29 |
| IV. | Structure | 43 |
| V. | Development | 59 |
| VI. | Perfection | 79 |
| VII. | Beauty | 91 |


## PART II.

### BRITISH WOODLAND TREES.


| | | |
|---|---|---|
| 1. | The Wavy-leaved Oak | 111 |
| 2. | The Flat-leaved Oak | 125 |
| 3. | The Ilex | 128 |
| 4. | The Ash | 133 |

PAGE

5. The Small-leaved Elm . . . . . 139
6. The Wych Elm . . . . . 146
7. The Beech . . . . . 149
8. The Lime . . . . . 156
9. The Ivy . . . . . 162
10. The Chestnut . . . . . 166
11. The Horse-Chestnut . . . . . 173
12. The Walnut . . . . . 179
13. The Sycamore . . . . . 185
14. The Western Plane . . . . . 190
15. The Oriental Plane . . . . . 198
16. The Maple . . . . . 202
17. The Arbutus . . . . . 206
18. The Privet . . . . . 210
19. The Mountain Ash . . . . . 214
20. The Spindle Tree . . . . . 218
21. The Guelder Rose . . . . . 223
22. The Wayfaring Tree . . . . . 226
23. The Black-fruited Cherry . . . . . 229
24. The Red-Fruited Cherry . . . . . 233
25. The Pear . . . . . 235
26. The Bird Cherry . . . . . 239
27. The Wild Service Tree . . . . . 242
28. The Apple . . . . . 245
29. The White Beam . . . . . 249
30. The Honeysuckle . . . . . 252
31. The Hazel . . . . . 256
32. The Barberry . . . . . 259
33. The Hornbeam . . . . . 262

PAGE

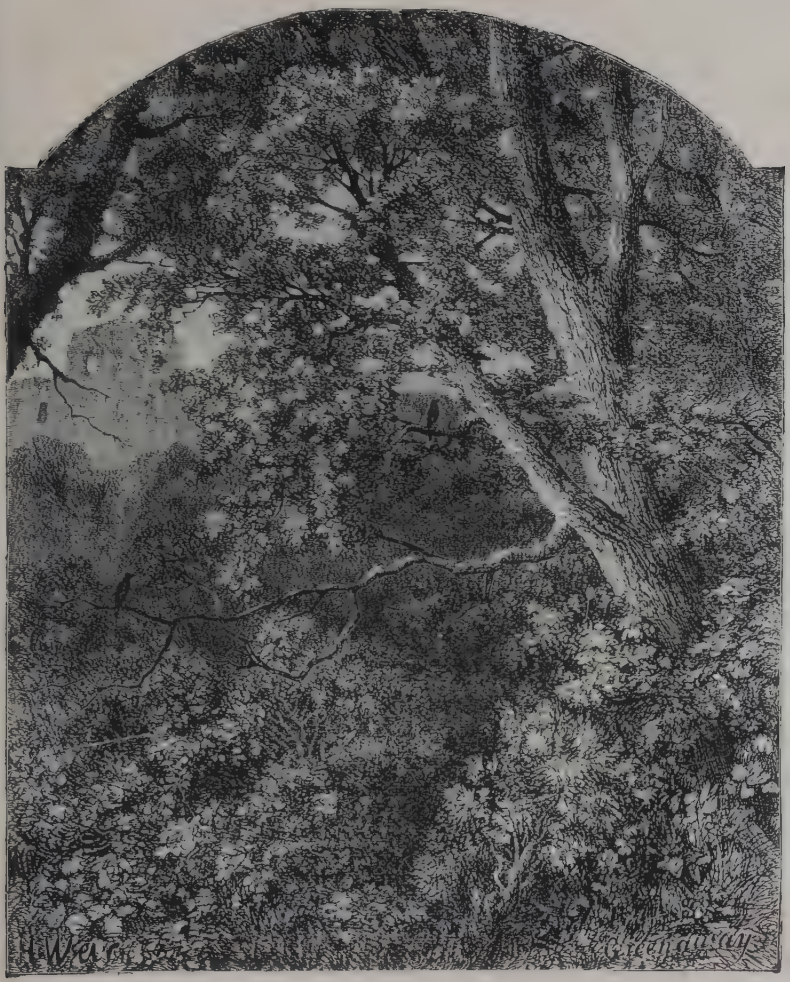
34. The Acacia . . . . . 264
35. The Black Poplar . . . . . 268
36. The Grey Poplar . . . . . 274
37. The White Poplar . . . . . 276
38. The Aspen . . . . . 279
39. The White Willow . . . . . 281
40. The Weeping Willow . . . . . 284
41. The Birch . . . . . 286
42. The Alder . . . . . 291
43. The Hawthorn . . . . . 294
44. The Blackthorn . . . . . 298
45. The Buckthorn . . . . . 300
46. The Alder Buckthorn . . . . . 302
47. The Dogwood . . . . . 304
48. The Elder . . . . . 306
49. The Box . . . . . 309
50. The Cedar of Lebanon . . . . . 315
51. The Pinaster . . . . . 321
52. The Juniper . . . . . 324
53. The Medlar . . . . . 327
54. The Silver Fir . . . . . 331
55. The Yew . . . . . 334
56. The Tamarisk . . . . . 338
57. The Stone Pine . . . . . 340
58. The Larch . . . . . 344
59. The Holly . . . . . 349
60. The Scotch Fir . . . . . 353
61. The Spruce Fir . . . . . 358

# PART I.

## THE LIFE OF A TREE.

# Chapter I.

## INTRODUCTORY.



'A Tree to the thoughtful and loving student of Nature suggests ideas of beauty and perfection to which the mind cannot be lifted, save by a process of wondering admiration.' [*Page* 7.

# BRITISH WOODLAND TREES.

## The Life of a Tree.

### CHAPTER I.

#### INTRODUCTORY.

A TREE, to the thoughtful and loving student of Nature, suggests ideas of beauty and perfection to which the mind cannot be lifted, save by a process of wondering admiration. The minutest forms of vegetable life—forms which our unassisted eyes cannot even discern when the most vigorous powers of vision are brought to bear upon them—open up, under the microscope, vast fields for inquiry and research; and, from these almost infinitesimal points of depar-

ture there is a marvellous gradation, each stage of which represents a higher and higher state of progress towards completion—within the region of the vegetable kingdom—until is reached that which is the most wonderful and beautiful handiwork of the Creator, the absolute perfection of plant life—a Tree.

How minute are the starting-points—if we may so term them—of vegetable life, is scarcely comprehended by those who, through the engrossing claims of business or other occupation, may have had little time or opportunity for the study of Nature. What often appears to the naked eye on some dark object as the tiniest covering of dust, as some coloured film on a watery surface, or as the slightest of stains on wood or stone, reveals to us, when magnified, a little world of vegetable life, made up of countless numbers of individual plants, each one of which is possessed of a marvellous and beautiful organism, fitting it to live a separate existence; to develope, within its tiny sphere of growth, by the cohesion and co-operation of its atomic parts; and, finally, to provide for the perpetuation of its kind, ere its

small life is given up, and it returns to the earth the elemental substances of which it is composed.

There are, indeed, few parts of the material world that are not instinct with the minutest forms of vegetable life, though oftentimes their presence can only be detected when they exist in vast numbers. The surface waters of the ocean are sometimes tinged with the most beautiful colours by the presence of myriads of almost infinitesimal plant forms. Vegetable forms exist also in the ocean's depths. Even in the air, and in the very bowels of the earth, it has been asserted, by at least one eminent naturalist, that plants grow. Plants, too, are to be found on the surface of ice-bergs; tinging with roseate hue the snow of the arctic regions; covering the surfaces of arid plains; crowding into the lowest depths of mines; clinging, as powdery crusts, to rocks and stones; spreading, in varying colours—as moulds—over all kinds of objects; entering, with subtle and often fatal power, as blights, into leaves, stems, roots, and tubers; infecting, with a strength like that of an epidemic disease, the living organisms of animals;

and, in short, penetrating everywhere, endowed with mysterious persistence and vitality, and sometimes, with a grasp on life which withstands degrees of heat and cold that are fatal to the majority of plants, and of plant germs.

If we turn from these, the most minute of the inhabitants of the great plant world, to the forms which, still minute, nevertheless come, individually, within the range of human vision, we shall but have reached another stage in the gradation of objects which lie within the realm of the vegetable kingdom. Looking around from this new standpoint we shall find ourselves in quite another world, with almost exhaustless material for wondering admiration—the world of moss and lichen, where Nature, with ten thousand forms of beauty, carpets the ground, flings her green mantle over wall, and rock, and Tree trunk, and clothes sea-shore and stream-bank with a verdant host of her tiny children.

One more stage upwards in the gradation of plant life. The forms which now engross our attention are small still; but they are of size sufficient to give us an indication of their pre-

sence—even were they deprived of other attractions—by the soft rustling sounds which they give forth when they are gently touched by the wind. Perhaps the careless man will see nothing to admire in a blade of grass. Yet is not the soul of the sincere lover of Nature moved with a pleasurable emotion when looking at the refreshing expanse of a rolling meadow, even when no bloom of colour occurs to relieve the uniformity of waving green? But rarely, during springtide and summer, do we wander anywhere without sight of at least one floral crown, if it be only a modest daisy, or the golden calice of a buttercup peeping out perhaps from the tiny strip of greensward which may front a city dwelling, or from the half-rural roadside of a town suburb; and if we pass beyond town limits we may see many a wide expanse of level meadow, gentle upland or hillside, bathed in a rich glow of colour from myriads of floral crowns —unbroken white, or gold, or purple.

Turning from the flowers which nestle amongst the blades of grass, and from the rustling green of these tender herbs, we shall pass, by another as-

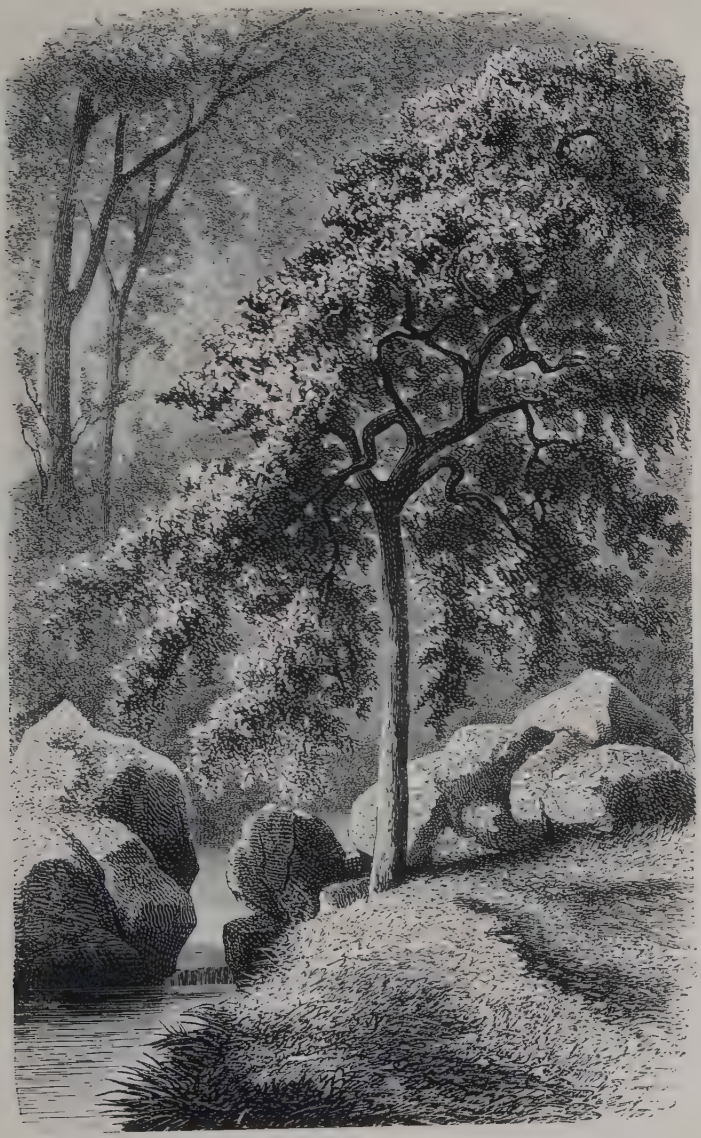
cent in the scale of vegetation, through a gradation of varying beauty. Beauty, indeed, meets us everywhere. If from the empurpled hillsides, rising from our moorlands, we descend to the golden mazes of gorse in the plains below, and pass thence into the deep, soft shade of the woodland, we shall meet the graceful forms of clustering ferns, scent the sweet perfume of the honeysuckle, admire the glossy green of trailing ivy around the small forms of modest shrubs, and thence by sweet gradation within the woodland shade, look higher and higher, until we have comprehended how much of beauty and grace, of vigour and stability is embodied in the perfection of a Tree.

But this beauty and this grace—this vigour and this stability—qualities which place Trees in the order of excellence far above all other growths within the vegetable kingdom—are results which, in their full perfection, can never be manifested within less than the life of a generation, whilst oftentimes a period for the fulfilment of this beautiful purpose is required of longer duration than the life of many a nation. Yet the wise Giver of all good things has so beautifully ad-

'Into the deep, soft shade of the woodland.' [*Page* 12.

justed the lives of Trees to the lives of man that no generation of men is born without finding the perfection of the Almighty's handiwork in the vegetable world. We know that in the beginning, before the creation of man, God said, 'Let the Earth bring forth grass, the herb yielding seed, and the fruit-tree yielding fruit after his kind, whose seed is in itself, upon the Earth.' And we know also that in the omniscient order of things 'the Earth brought forth grass and herb, yielding seed after his kind, and the tree yielding fruit whose seed was in itself, after his kind;' and that 'God saw that it was good.'

Though the period of time required for the full development and perfection of a Tree is so long, there is no stage of its growth during which it is not beautiful and useful to man; and though man, in the ordinary course of nature, cannot watch the rise and fall of an individual amongst the noblest order of Trees—cannot, for instance, watch the rise and fall, if the fall be not premature, of an Oak—he will find that there is no stage of the Tree growth that he may not be able to study and admire.



'The Tree yielding fruit whose seed was in itself.' [*Page* 15.

## Chapter II.

# THE TREE GERM.

## CHAPTER II.

### THE TREE GERM.

NOTHING in Nature is more wonderful than the relation which exists between the most magnificent growths of the woodlands and the tiny seeds from which they take their origin. It is not owing to adventitious circumstances, due to isolated though persistent exercises of creative power, that the small seed in time becomes a mighty Tree. The vital principle of the Tree is embodied in the seed. The Almighty power has been exercised once in the endowment of the germ with its marvellous power of development. All else—all that follows—is but the setting in motion of an organization

already possessed — possessed not indeed in the way which appeals most powerfully to the human eye—as in the expanded form of stem, leaf, and blossom—but in the minutest form of incipient life.

But this marvellous power, this setting in motion of the perfect and beautiful organization of the seed, is, in the Divine economy, and by the exercise of Divine wisdom, ordered only in its fit and proper season, and by the co-operation of other of the forces of Nature. Of these co-operating forces, and of the marvellous and beautiful results which they produce, we have not here to speak. Our immediate purpose is to explain —so far as explanation is possible—the position occupied by the seed when it has, in its perfected state, endowed with the vital principle of life by subjection to the mysterious process of fertilization, left the parent plant; but before it has—through the stimulation of its latent vitality by the active influence of external forces—been launched on its wonderful career of development.

The perfect seed, then, in its quiescent state, may be said to consist of two distinct parts—a

vital part endowed with actual though latent life, and an inanimate part. The first part is the plantlet or embryo plant. The dead part is that which ministers to the embryo by providing it with food and shelter. Each of these two principal constituents of a seed are again divisible into parts, though the parts have the same general character as the whole, and are either living or dead. The latter—the dead parts—to speak of them first, are the seed-coverings, cases, or envelopes—the houses, or temporary abiding-places of the plantlets—and the secreted food of the latter. They are familiar to all persons, as envelopes, in the shell of the walnut and hazel-nut, and in the hard shining skin or case of the chestnut and acorn. The embryo coverings, or *integuments*, as botanists technically call them, are usually double. There is an outer integument called the *testa*, and an inner one called the *tegmen*.

How beautiful as well as useful are the outer integuments of the seed is shown in their form and colour. Sometimes they are beautifully white and glossy, at other times of a shining ebon black

Between these extremes there are varying shades of colour. The surface of the seed coat, too, is sometimes smooth and sometimes rough, sometimes plain and sometimes externally ornamented by beautiful markings.

Passing now to a consideration of the living germ or plantlet, we find that this consists of a little body made up of three principal parts—namely, the *radicle* or germ of the future root, the *plumule* or germ of the future stem—and all that rises above ground supported by the stem—and the *cotyledons*, or 'seed leaves,' as they are popularly and beautifully styled. Here it should be explained that the part last-named may in an individual plantlet be single or double—a cotyledon or cotyledons; and the distinction serves to divide into two groups all the flowering plants in the vegetable kingdom. Those whose seeds are furnished with but one cotyledon, or, if with more than one, having them placed in alternation on the embryo, are termed *Monocotyledons*. Those with cotyledons placed opposite in the seed, and in number consisting of two or more—the number is generally two—are termed

*Dicotyledons.* It would be going beyond the scope of the present volume to discuss the distinction further, except to remark that these divisions of flowering plants—amongst which, of course, Trees are included—usually represent distinct kinds of structure and distinct methods of growth.

The size and form of the cotyledons in the dicotyledonous plants, which include nearly all our woodland Trees, are greatly varied. They are usually roundish bodies, are sometimes thick and fleshy, as in the acorn and in the chestnut; sometimes thin, as in the Maple seed, and at other times crumpled or folded. Their purpose is to furnish—if we may borrow an expressive term from the science of mechanics—a sort of fulcrum to the plant in its earliest stage. Between the twin cotyledons is placed a small variously-shaped but usually cylindrical body consisting of two parts, united to each other end to end, the plumule and the radicle, which are, as we have seen, the one the germ of the future stem, the other the germ of the future root. The root end, destined to grow downwards and develope into the perfect

root, is conical in shape. The opposite end, destined to grow upwards and develope into stem, branches, and leaves, is blunter; and this distinction, in the incipient forms of the root end and the stem end of the *axis*—as this double germ of the plantlet is, from its central position, called —very nicely foreshadows the qualities of stability and penetration finally established in the future stem and in the future root.

The surface of the integuments, or coverings of the vital parts of the plantlet, is pierced by a tiny aperture called the *micropyle*—a term derived from two Greek words, which mean a 'small mouth.' This aperture is the opening through which the mysterious process of fertilization has been performed by the pollen of the fertilizing organ; and it is to be especially noticed that the conical-shaped radicle of the axis of the embryo is almost invariably found so placed as to point to the micropyle.

But Nature is not content to make her enveloped seeds perfect in every part. She endows them with some quality which shall enable them, when freed from the parent plant, to find their proper

sphere of growth. Sometimes she temptingly baits them with luscious edible coverings, which may tempt birds or animals to disperse them; and sometimes she provides them with wings that they may themselves take flight, and find fit resting-places, as in the downy hairs of the seeds of Willows and in the membranous wings of Pine seeds. More than a century before the commencement of the Christian era Theocritus wrote, 'Sweet is the murmur of the wind among the Pine trees;' and how beautiful is the reflection that oftentimes in the mellow seeding time the aërial currents bear away lovingly, on the sweet crest of a musical swell, the winged germs of a future generation of Trees!

There is yet one more consideration anent the perfected Tree germs. In what degree has Nature endowed these germs with the principle of vitality? How long can they resist the operation of decay—a process which dissolves the cohesion and prevents the co-operation of the mysterious forces which conduce to growth? These are deeply interesting questions. But we cannot answer them satisfactorily, and can only furnish

a partial reply by a reference to a few known and isolated facts. These lead us to the conclusion that the vitality of seeds is extremely variable—in some cases being of short duration, in others extending over marvellous periods of time, when circumstances have prevented the operation of the process of germination. Instances of seeds which have germinated after having lain dormant for more than a century have been authenticated, and there is presumptive evidence of the germination of seeds which have been disentangled from geologic strata. Even if we alone accept the recorded instances of germination suspended over the long period of a hundred years, can we do otherwise than marvel at the persistent vitality thus displayed?

# Chapter III.

## EARLY GROWTH.

'There is something very beautiful in the gentle awakening of flowers, shrubs, and Trees, after their winter sleep.' [*Page* 34.

## CHAPTER III.

### EARLY GROWTH.

HOW perfect and beautiful is the provision made by Nature, within the small envelope of a little seed, for the setting in motion of the complex and marvellous system which is destined to produce the future Tree we have seen in the preceding chapter. We have seen that within the shelly or other integuments, often fashioned with singular beauty, of the Tree germ there is latent vitality; but we have said nothing of the active life of the germ. We have touched only upon the preparations made for the commencement of that life, merely discussing the position of the seed in its dormant

condition, and noticing for how long a period this dormant condition may be continued—over what a great extent of time—as man is accustomed to measure time—the concentrated energy and power of growth may be suspended through the absence of that sympathetic touch which Nature, in her gentle moods, impresses upon the plant world.

Spring, in our native woodlands, is the season of early growth; and there is something very beautiful in the gentle awakening of flowers, shrubs, and Trees, after their winter sleep. We have not here, as in the tropical world, the charm of perpetual spring and summer. The genial rain and warmth of the one, and the resplendent glory of the other, are followed by the falling of the leaf, and by the icy chill of winter, when slumber falls on all, save a few of our native plants. The change brings cheerlessness to our woods and fields; but it prepares us for the joyousness of the succeeding spring, to which it helps to impart a pleasure that we should never know but for the intervention of the dormant season.

Throughout this dormant season the seed,

'The icy chill of Winter.' [*Page* 34.

ripened after the fall of the summer flower which bore it, sleeps like the plants themselves. The wintry rains supply one condition of growth, but the frosty temperature is uncongenial to germination. It is only when the influence of spring —the season of gentle warmth and genial showers —is exercised upon the plant germ, that it enters upon its career of development. It is many days before we see the gentle uprising of the budding plant: for in the darkness of its subterranean resting-place the seed has given full employment to the mysterious forces of Nature; and there has been much to do in order to commence the release of the enfolded embryo, to burst its integuments, and to bring the ascending portion of its axis—the plumule—to air and sunlight, to kindly dews and softly moistening rain, at the surface of the ground.

But almost simultaneously with—though generally before—the upward growth of the plumule, the radicle has commenced a downward course, passing through the micropyle, and beginning the strain upon the integuments, which, taken in conjunction with the continuous expansion of the

embryo, succeeds in first bursting and finally throwing them off. The seed-like form of the plant germ is now no longer apparent. We have the plantlet—immature and undefined as yet—but freed from its enveloping shrowd: the joined plumule and radicle fixed—like a swimmer supported by corks—between the twin cotyledons.

And now, for a brief space, these small, but well-nourished bodies, perform the kind and useful office of nurses to the incipient stem and root. We shall see anon how the last-named organs, when they have reached a certain stage of their early growth, begin to provide themselves—by the aid of some very simple but very beautiful organs—with their natural food. Meanwhile, their earliest supplies of the nourishment necessary to qualify them for self-support are provided by the cotyledons. The elongation of the radicle and of the plumule, is, however, continued but a short distance before these organs commence their self-supplying functions.

The radicle becoming, by enlargement and elongation a root, the latter commences to multiply itself by giving off branches which, being

usually more slender than the body from which they proceed, are called root fibres. It is these fibres, or rootlets, which penetrate the ground by insinuating their extreme points into the earthy interstices, displacing, by expansion, sufficient earth to provide room for themselves. The collecting apparatus, however, for gathering what nourishment the plantlet requires from the soil, is supplied, not immediately by the root or root fibres, but by a beautiful series of delicate root hairs. These grow out from both the main root and the rootlets in large numbers, and being long, tubular bodies, though very minute, they absorb moisture from the surrounding earth by means of that, as yet unexplained, force—capillary attraction. The moisture thus extracted from the earth holds in solution those chemical substances which—by a beautiful and marvellous process of assimilation—minister to the growth of the embryo plant, and promote its stability.

The plumule, meanwhile, has been forcing its way to the surface of the ground, there to unfold a couple of tiny incipient leaves. In some plants the ascending plumule carries the cotyledons to the

surface, where they unfold, and spread out their surface to the light, under the influence of which, by a process which will be subsequently explained, they change their colourless appearance to green, and fulfil for the plant in this, its early stage of growth, the same offices as are, at a later period, discharged by the leaves of the more advanced after-growth.

A stem has now been formed by the prolongation of the plumule: and the unfolding of successive leaves, as this stem continues its progress upwards, powerfully aids the growth of the young plant; for the leaves, as we shall subsequently see, obtain from the atmosphere a large proportion of that which constitutes the bulk of the plant's substance.

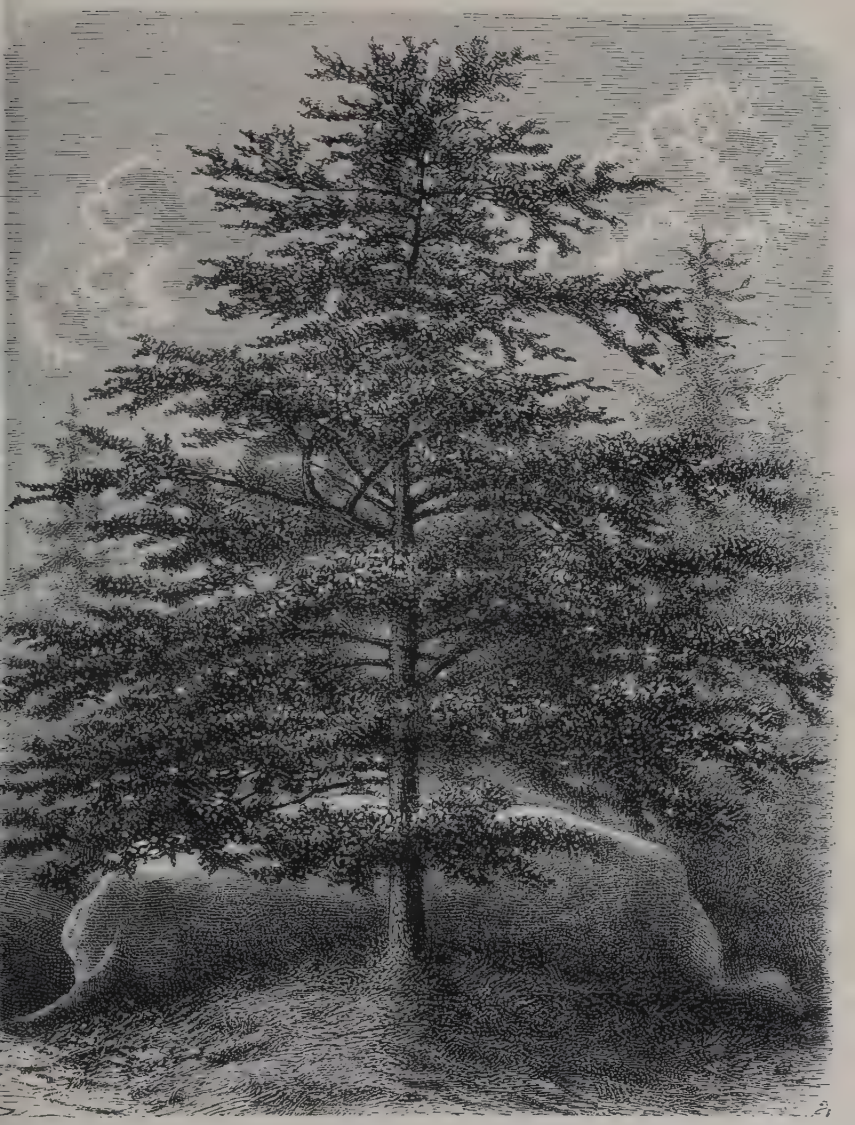
It is, of course, assumed that the beautiful process which has been described, continues its operation only under the continued influence of the conditions which occasioned its commencement—conditions which are naturally brought to the mind by the mention of the word 'Spring,' so suggestive as that word is of soft rain and gentle warmth. The temporary absence of sufficient warmth would

check the young growth, which would, however, be resumed on the resumption of the necessary condition; but the entire absence of moisture, through the aridity of the soil, would be fatal in its effect, because the root hairs would cease to perform their functions, and the plantlet would shrivel and die.

At this stage of our history of the progress of growth in the Tree germ we must pause for some explanation as to the nature of the substances of which the vegetable organs to which we have referred are composed.

# Chapter IV.

## STRUCTURE.



'There is so much of stability and permanence in the qualities which distinguish Trees from other and more fragile kinds of vegetation.' [*Page* 47.

## CHAPTER IV.

### STRUCTURE.

THERE is so much of stability and permanence in the qualities which distinguish Trees from other and more fragile kinds of vegetation that especial interest must attach to inquiries concerning their structure. The whole subject relating to the structure of plants is indeed exceedingly interesting to the student of Nature. But perhaps for the general reader, as that expression is usually understood, herbaceous plants—plants, we mean in this sense, that die down to their roots each year—have not quite the attraction which strongly induces investigation concerning the chemical substances of which

they are formed. Such plants, from the circumstance that they disappear from sight and generally from mind during the dead season of winter, are chiefly valued for their beauty or fragrance during spring, summer, or autumn. With the departure of their delicate tints and gorgeous colours, of their vernal freshness and sweet perfumes, they pass from the memory. But Trees are ever with us. When the budding beauty of spring, the full glory of summer, and the mellow charm of autumnal colouring have all departed, the Tree forms remain, and we can enjoy and admire the noble breadth of their trunks, the beautiful proportions of their limbs, and the delicate tracery of their filmy branches, bare, it is true, of their charming tresses of glorious leaves, but full of a grace and beauty which appeal powerfully not merely to the eye of the artist but to the soul of the lover of Nature.

An elaborate description of the chemical properties of plants would alone require the space of a bulky volume—a considerable portion of which would be occupied by discussions concerning the yet unexplained mysteries of plant life

and plant growth. Here we shall only attempt to state some of the principal facts which science has been able to establish—giving indeed so much as will naturally fall within the proportionate space which must be allotted to this part of the subject; yet enough, we trust, to satisfy all who have fairly comprehended the aim and object and the necessarily limited space of this volume.

Plants, like ourselves, are composed of substances which are drawn by absorption and inspiration from the material world. Like ourselves they may be said to drink and to breathe—some even to eat. Like ourselves too, the matters absorbed and inhaled into their system are assimilated by them for the purpose of supplying the waste and contributing to the growth of their bodies. Unlike ourselves, however, their ordinary processes of growth—after the termination of the early growth which we call germination—are unattended by the production of heat which is not common to the earth or air or water in which their parts exist. They are indeed of the same temperature as the material substances which

surround them and in which they grow, for the reason that such temperature is communicated to them from surrounding objects by the natural process of conduction.

We have already seen that the principal sources of the food of plants are air and water; and it is from these apparently simple substances that they obtain what they need to build up and consolidate their marvellous and beautiful structures. Water and air are words which convey very indefinite meanings except to the students of natural science. Water itself—by which we mean pure water, a substance which can only be obtained by distillation—is a chemical compound of hydrogen and oxygen gas. But natural water, as the term is popularly understood—water such as is found in the earth—is never pure, for the reason that it holds in solution—that is to say, in a liquid form, mixed but not chemically combined with the elemental particles of which pure water consists—certain chemical substances varying with varying circumstances both in quantity and quality. These substances often include calcium, iron, nitrogen, phosphorus, potash, soda, and sulphur;

and it is from these, absorbed by the plant, that it manufactures by the further aid of the hydrogen and oxygen of which the water is itself composed, and of carbon obtained chiefly from the air, that which constitutes its own substance. We may call these various substances the raw materials used by the plant in its process of manufacture, and it obtains them all either in a liquid or a gaseous state, transmuting them into solids for the purposes of its own solid structure. We have seen that the substances in the earth upon which the plant feeds are all—in a liquid form—absorbed by the root hairs exercising the power of capillary attraction, and conveyed into the plant by the exercise of the same power of attraction, which continues until the liquid matters have reached their proper destination.

But to enable the plant to assimilate the various matters which it derives from the soil and from the air, there must necessarily be a pre-existing structure; and by microscopical examination and the aid of the science of chemistry, we are enabled to ascertain the form of this structure and the nature and quality of the substance of

which it is composed. The germ, for instance —the embryo of the future plant—enclosed in its small envelope is, we find, built up of a system of minute cells or cavities. There is, even in the minutest plant germ, a vast number of these cavities, and they are all constructed with marvellous and beautiful regularity. Nothing perhaps could better illustrate the beauty and symmetry of the form and arrangement of these cells than the familiar example of a honeycomb. But there is this difference. Instead of the aggregate of cells in the plant germ forming a rude and shapeless mass, they all contribute to the formation of objects of exquisite beauty, the variation of external form in which is almost endless, being co-extensive with the varied and multitudinous forms of plants in the vegetable kingdom. The framework then—if we may so term it—of the plant germ consists of a series of walls investing an innumerable number of cells, or little chambers, packed closely together after the manner—though the shape of the cavities is different—of the cavities in the honey-comb, invested by their framework of wax. The cells in the plant germ are

filled with a viscous or semi-fluid matter called *protoplasm.* The investing walls are formed of a substance called *cellulose,* intermixed with a watery fluid absorbed into the plant by the medium of its roots.

An embryo plant, then, consists of a system of cells and their contents; and the convenient expression *tissue* is used to imply the entire substance of which it is composed. There are differing kinds of tissue. *Cellular* tissue, as its name implies, consists of little cells or bags—which are mostly roundish or oval, in shape—and their enclosing protoplasm. It makes up the softer parts and forms the major portion of the substance of most plants. It indeed is very much the same to the plant as the flesh is to an animal body. *Wood* tissue consists of tubes or cells longer one way than another. These cells form, lying together and compressed, what we call wood. The walls of this kind of tissue become thickened as the plant grows; and it is by the thickening process that the qualities of hardness and firmness which we distinguish in wood are originated. *Vascular* tissue consists also of elongated cells

or tubes. But the walls of these are thinner than those in wood tissue, and they enclose long vessels, or *spiral threads* as they are called. The walls which enclose and make the cavities which are called cells—whether the latter are roundish as in cellular tissue, or oblong as in the tubes of wood or vascular tissue—consist, as we have seen, of a substance called cellulose, a substance compounded of carbon, hydrogen, and oxygen. The enclosing mass of protoplasm or the viscid material, which forms the cell contents, consists of carbon, hydrogen, nitrogen and oxygen.

The green colour which gives so much of their beauty to plants, is caused by the presence within the superficial cells of their tissue of minute granules of a matter called *chlorophyll*. These granules exist in great abundance, and can be seen so clearly through the thin transparent surface walls of the superficial cells that they give their familiar hue to all the green parts of a plant. The beauty of colour, too, in the bloom of plants is caused by the presence of other granules of colouring matter—granules which owing to their varied distribution throughout the flower petals

and the varying manner in which they are affected by chemical influences, including the varying effects of the influence of light upon them, impress us with that exquisite sense of colour which lends so great a charm to flowers. So far as science has yet been able to comprehend this subject—for there is very much which still remains undiscovered and undetermined—it has been found that there are not less than seven substances of the nature of chlorophyll existing in differing plants; that these substances have distinct colouring capacities, and produce by commixture in varying proportions the exquisite shades and variations of colour in the plant world. It will therefore be desirable, as the word chlorophyll has generally been used to distinguish only that substance which gives to plants their green hue, to use the word *chromophyll* as one expressive in a general way of vegetable colouring matters; for we erroneously refer to the colour green, many plants whose leaves are much more than green. There is, for instance, a tinge of blue in many a leaf, there is gold in the foliage of Limes, and gold in the leaves of the graceful Beech.

Purple and crimson too, and other hues and colours, are found oftentimes delicately mixed with the green of our leaves; and though the pervading greenness is often so conspicuous that it is difficult to detect the presence of any other colour, much of our sense of enjoyment, occasioned by the contemplation of 'lush greenery,' doubtless arises from the beautiful though almost imperceptible intermixture of other and lighter or darker shades. The gloss on the leaves of many plants is due to the extreme transparency and reflecting power of the surface walls of the superficial cells.

The embryo plant, then, consists of a beautiful cellular framework enclosing a protoplasmic fluid—the part underground being, from the absence of the chemical influence of light, devoid of colour; the part above ground being by the chemical action of sunlight displayed in hues equalling in richness and exceeding in number, by intermixture of shades, those of the rainbow. We have seen what is the structure and function of the rootlets and roots, stem and leaves. They are all cellular tissue modified by circumstances, and, by Divine wisdom,

cast into an infinite variety of forms. We have seen how the roots absorb nutriment from the soil, and what organs act as the means of communication. It remains to be shown that the means by which the leaves absorb their gaseous food from the atmosphere, are those provided by the existence of minute orifices in the leafy surfaces—chiefly on the under surface of the leaves. These orifices—called *stomata*—are oval in shape, and are very abundant; so much so indeed, that in a single leaf of some Trees—the Apple will furnish a familiar example—there have been counted more than a hundred thousand! Through their stomata, or breathing pores, plants not only absorb air but give out their surplus moisture; and thus by the superabundance of the liquid which they derive by their roots from the earth, they are enabled to promote, around the tender forms of their leaves, the congenial moisture which is so conducive to healthy life and to vigorous growth.

# Chapter V.

## DEVELOPMENT.

## CHAPTER V.

### DEVELOPMENT.

FROM the embryo plant to the perfected Tree, the successive stages of growth are accomplished in varying degrees of rapidity. The causes which promote a more rapid rate of growth in some species of plants than in others are amongst the mysterious facts relating to the development of vegetable life. We can, more easily, ascertain the reasons for the difference in the rate of progress in different individuals of the same species; for they mostly arise from differing degrees of vigour, or from more or less favourable conditions of growth. But if we subject two young Trees of different species, each

being the most vigorous individual which can be selected of its kind, to two sets of conditions of growth, each of which is the most favourable—in the matter of soil, moisture, and aspect—to the individual species, we shall find, in general, a wide divergence in the rate of growth. There is an equally wide divergence in the habits of plants between the various species. Trees, for instance, are distinguished from each other by the characters either of their trunks, of their limbs, of their leaves, or of their spreading, or other manner of growth. Without venturing to look for any explanation of the difference in the habits of different plants, to the theory—relating to the origin of species—propounded by an eminent naturalist, we may be assured that, whatever causes have occasioned the infinite variations in the forms of life in the natural world, these variations have been planned and accomplished by the beneficent Creator in order to promote the greatest happiness of mankind.

The method of cell division and multiplication is amongst the most interesting of the processes connected with the development of plant

life, the history of which will here be briefly traced from that period of its early growth at which the plumule of the embryo, after just emerging from its seed cover, has reached the surface of the ground, and has there unfolded its twin incipient leaves. The cells of the cell system of which, as we have explained, the embryo plant is formed, are at first very minute, consistently with the wise and beautiful economy of space observed throughout the natural world. Everything, indeed, in the delicate structure of the incipient plant is moulded on the smallest possible scale, for the reason that the means of necessary growth are provided in the elemental substances existing in the earth. The walls of the early cells are very thin, and the cell cavities are full of the protoplasmic matter which is—if the expression may be used—the life-blood of the plant. In the centre of each cellular mass of protoplasmic fluid, surrounded by its investing walls of cellulose, there may be observed a rounded substance darker than the general mass—the word 'mass' is used as a convenient expression, although it will be understood that it refers to

a minute portion of matter. This darker substance is, in reality, merely a portion of the protoplasm; but it is distinguished from the other portions by being designated the *nucleus*. Growth in the young cell commences by the enlargement of the cell walls. The protoplasmic contents not growing at the same proportionate rate, holes or cavities are left in their substance, and these cavities are filled with a watery liquid which constitutes what is called cell-sap. The cell walls continue to be lined with layers of protoplasm; but it is believed that by the nucleus separating into halves, the same kind of division is effected by a half of the surrounding protoplasm collecting round each portion of the divided nucleus. Between these separated portions of the original nucleus a wall of cellulose begins to form, and, when its formation is completed, it will be seen that the original single cell has become two.

By the repetition of this process of cell division the growth of young cellular tissue is effected, and the plant increases in size. The rate of increase varies with the varying nature, in different

plants, of the power of growth; in some cases being marvellously rapid, in others much slower. When the cells have ceased to divide, they begin within themselves—each within each—a process of development—a process, in some cases, shown by a continued secretion of cellulose by the protoplasm, ending in a considerable thickening of the cell walls; in other cases by the manufacture from the protoplasmic fluid of various substances, which, in the wise economy of Nature, minister to the necessities and enjoyments of man.

How beautiful, indeed, yet how wonderfully mysterious is the influence of this power of development in plants! There is sweet co-operation between air, earth, and sunshine in order not only to perfect the beauty but to promote the usefulness of plant forms; for from the simple elemental materials which have been already enumerated are formed in the cells, various substances, including chromophyll, oil, resin, starch, sugar, and wax.

The development of a Tree naturally presents itself to us as being of six different kinds. There is development of the root, of the stem, of the

branches, of the leaves, of the flower, and of the fruit or seed.

Beginning with the root, we have seen that its incipient form consists of an elongation of the radicle of the embryo. Development takes place by continued elongation and branching, the branches being at first very thin and minute.

As we know that a certain density of the soil is essential to healthy plant life, we arrive at the conclusion that the conditions most favourable to root growth are those in which the embryo plant is surrounded by particles of earth having just sufficient porousness to admit a certain amount of air, and to permit the percolation of water. The root fibres, or filaments, which are at first the most delicate of threads, are pushed out by the power of growth from the root-stock or radicle of the plantlet, and insinuate themselves into the tiniest of the surrounding earthy interstices. Receiving nourishment from the damp soil through the medium of the root hairs—long, hollow cells, which absorb moisture by capillary attraction—they rapidly become en-

larged, and displace the soil around them. They then, in turn, give origin to other branches, which, in like manner, elongate, increase in size, and ramify. This process continuing, there is formed, with greater or less rapidity, according to the species of plant, and its power of growth, an extensive ramification; until, in the case of a full-grown Tree, we have a network of roots extending oftentimes, both vertically and horizontally, to a considerable distance from the bole of the stem, the primary, or first formed root-branches, frequently acquiring an enormous size, and making an appearance when, as is often the case, they are seen above the surface of the ground, like large branches of the trunk. From these enormous root-branches there is a regular gradation downwards in size, the ultimate filaments being amongst the most minute of threads. The upheaving power of the roots of large Trees is enormous: for, as the roots grow in size, they become hardened by the transformation of their soft tissue into the thickened and consolidated tissue which we call wood; and these woody

roots swelling as the Tree developes, exercise so much force that they have often been known to destroy buildings by displacing the stonework of their basements.

Meanwhile, during this process of root development the marvellous power of growth has been manifested above ground. The plumule has been elongating from its root pedestal into the stem, which is the mainstay of the plant—the column which is to support its system of branches, leaves, flowers, and fruit. The formation of the stem in flowering plants gives occasion for their division throughout the vegetable kingdom into two great classes, called respectively, *Exogens* and *Endogens*, terms suggested by the facts that whilst the first-named class comprises plants whose growth is effected by additions to the stem or trunk outwards, *Endogens* increase by internal growth. The tissues of *Exogens*, too, are arranged upon a different plan from those of *Endogens*. The differing modes of growth and of the formation of the stem chiefly distinguishing *Exogens* from *Endogens*, we need not give in elaborate detail. All our forest Trees being

exogenous—that is, growing by development of their stems outwards, we shall here discuss only that method of growth.

We ordinarily express the growth of Trees as we express the growth of man, reckoning its extent or duration by years. Our growth, however, is mostly persistent; that is to say, we grow continuously, with little regard to seasons, until we have reached our maximum state of development. But Trees are affected by the seasons, their period of growth being mostly confined to spring and summer, and rarely extending beyond the autumn. Amongst our deciduous Trees, or those whose leaves disappear in the autumn, or when touched by the first chills of winter, growth is suspended during the cold season. Hence, it is found that the additions to bulk during the annual periods of growth, observe a certain distinctness, and are shown in the stem—when cut across—by distinctive rings in the wood, each ring representing one year's growth. These ring-like appearances, or concentric cylinders of wood are formed by additions outwardly to the woody substance of the Tree, the innermost ring

representing the first year's growth; the succeeding rings of wood outwards representing the growths of succeeding years. By these interesting marks the age of a Tree can be ascertained—only, however, after it has been cut down, or some part of its trunk has been cut across.

If we take a completed first stage of the growth of a Tree—we may select for the purpose, as being one of the most familiar, both to town and country people, the Lime, and a stem of the age of one completed year will suffice for illustration—we shall find that the stem is built up of tissue in the following manner. There is a central column of cellular tissue, forming what is called the pith. Over this is a layer of wood tissue, mixed with a portion of vascular tissue. Next is a layer of *bast* tissue, or incipient inner bark. Then a layer of cellular tissue, or incipient outer bark. But running through the inner cylinders of tissue from the inner column or pith to the outer cylinder or bark are thin rays of cellular tissue. The direction taken by these rays or lines of cellular tissue may be indicated by comparing them to the spokes of a wheel. The

method of growth of the substance of the stem after the first year consists in an addition of wood tissue *outside* the first cylinder of wood tissue, and between it and the first formed bast tissue. The bast tissue is renewed by a new formation of that kind of tissue *inside* the old bast tissue—this last-named process of tissue formation being in the reverse order of that which contributes to the formation of wood; and it will be seen by this simple and beautiful arrangement that, whilst the method of exogenous growth of the wood tissue is adapted to the permanent consolidation of the woody or solid substance of a Tree, the formation of the newest coats of incipient bark—or *liber*—inside the earlier formed, or older bark, admits of the peeling off of the latter to make room for the increased circumference of the stem.

The formation of the buds which give origin on the stem of a Tree to its branches is a curious and interesting study, and is not by any means one of the least mysterious of the facts connected with the power of growth. By what marvellous influence is it that, at certain portions of the stem, at positions which are never fixed by un-

varying rules, and which constantly vary not only in plants of different species but in different individuals of the same species, there is a bursting forth of life—a budding into greenness—accompanied by the power—truly it is to us a mysterious power—to reproduce everything that has been produced before in the same plant—stems, branches of these, foliage, and fruit? All that can be explained of the branch is that it is a continuation of the stem on which it grows, with continuation of the stem-tissues, pith, wood, and bark, both inner and outer bark, moulded in varying forms and with varying degrees of grace and symmetry, but always with beauty—for whatever the Tree there is always delightful gradation from trunk to branch, from branch to twig, from twig to tiniest spray. Nature has beautiful, though varying, means by which to protect the tender bud from injury by cold or wet—biting frost or excessive damp. She covers it sometimes with gum, sometimes with hairs or scales, and sometimes with softest silk.

From the twigs or sprays of the spreading branch it is an easy transition to the leaves—the

green gems which add so great a charm to the branching forms which they clothe. As the twig is a continuation of the branch in the same way that the latter is a continuation of the stem or trunk, so the leaf is a continuation, but a continuation with expansion, of the tissues of the twig. The framework of the leaf—its veins or nerves, which spread out like a network—consists of fibro-vascular bundles, as they are termed, that is to say, of tissues formed by a commingling of of wood, bast, and vascular tissues. The softer supervening portion of the leaf, that which is spread out like a garment over the fibro-vascular framework, is made up of cellular tissue. The forms of these beautiful expansions of the tissues of plant stems are in number infinite as the infinite variations in the loveliness of Nature. Their purpose is to afford the largest possible surface for the beneficial and beautiful operations of air and sunshine.

Air and sunshine, indeed, are so largely concerned in the development of Trees as to contribute, by the elements of the one and the influence of the other, no less than one-half of

the substance which makes up their solid bulk. Carbonic acid gas—a combination of carbon and oxygen, largely contributed by respiration from animal lungs—is diffused throughout the atmosphere. Leaves, through their breathing pores, inspire this gas, appropriate for purposes of development and growth the carbon of the compound, and return the life-giving oxygen to the air, to add to the healthfulness of their surroundings. The glorious sunshine, which adds its golden hue to foliage, contributes its action —action mysterious though beautiful—to stimulate the process; so that there is co-operation in this marvellous work of usefulness between two of the most beautiful of the forces of Nature.

At a certain stage of growth—varying in different species of Trees and in different individuals of the same species—commences the production of the flower and the formation of the seed which is to follow the foretelling bloom. The blossoming of a Tree is not, as in so many other plants, the precursor of decline and decay; nor is this period of its life the sign of perfection;

for development continues long after the 'first fair blossoming.' It is but the beginning of perfection; and of all the processes of Nature there is none more beautiful than the flowering of a Tree. Yet wonder must always be mixed with admiration when we think of the operations of Nature. Who can define or determine the causes which lead to the production of a flower? What influence is it that accelerates or retards the period of that production? Why is it that sometimes, whilst all the necessary conditions of infloresence appear to be present, there is no blossoming, or blossoming is inexplicably delayed, or is curiously intermittent? What is it that determines the place—subject to so many unexplainable changes—at which the blossoming shall occur? And lastly—and this indeed comprehends the whole question—what is the mysterious influence which, at a certain period of the plant's history, causes the bringing to one or to ten thousand parts of its surface of the sweetest forces of Nature—forces which contribute to the formation of the floral stem, of its green sepals, of its richly coloured or sweetly scented

petals, of its stamens—with their mysterious anther-borne pollen—and, within the floral envelope, of the incipient ovule encased in its curious cover, and destined, after the mysterious process of fructification, to become the seed—that is to say, the embryo of the future Tree, with all its suggestiveness of strength and of beauty?

'Trees are always beautiful.' [*Page* 96.

# Chapter VI.

## PERFECTION.

## CHAPTER VI.

### PERFECTION.

THERE is something which inspires the lover of Nature with an inexpressible feeling of awe in the contemplation of the perfect form of a noble Tree. Yet it is by the gentlest of natural influences—influences so gentle, and oftentimes so slow in their operation, as to be imperceptible after any other than long periods of time—that such gigantic strength and such amazing stability have been built up and established, as we see embodied in many even of our woodland Trees. From the tender stage of its first completed year, when the stem contained, besides its pith, its incipient first cylinder of

wood, its liber or inner bark, and its outer bark, with its beautifully arranged radiation of cellular tissue from centre to circumference, there has been continual increase, chiefly shown, as years have rolled on, in the woody consolidation of the trunk. The early office, and indeed the chief use of the pith, have consisted in ministering only to the early growth of the Tree. Through this column of tender succulent tissue the moisture absorbed by the rootlets has been first carried, passing from cell-wall to cell-wall, and contributing, by its wonderful changes, to the formation of wood and bark and leaf. Then, with the formation of the first year's cylinder of wood, the *alburnum* or *sap-wood*, as this cylinder when young and soft is first called, itself acts as the chief medium for the conveyance of the sap from root to stem, branches, and leaves—the *medullary rays*, or radiating strips of cellular tissue, acting, in a measure, as the branch canals for the more even and perfect distribution of the sap. As woody layer is thus laid upon woody layer—each alburnum cylinder fulfilling in turn the office of nurse before becoming hardened into wood—there is

'With the sun's light, acting from season to season upon the gaseous and fluid contributions to the life of the Tree, the whole of the wonderful work has been performed.' [*Page* 85.

consolidation of the substance of the Tree as new sap-wood each year adds to its circumference—the pith falling out of use, and oftentimes drying up, and the Tree secreting substances which help in the work of consolidating its woody matter. Meanwhile a beautiful office has been filled by the air passing into the leaves through the stomata, and thence at first down certain interstices called *intercellular spaces*, lying between the masses of cells, and on into the tissues of the Tree, helped in its progress, it is believed, by the spiral nature of the threads which are found in the tissues. With the sun's light, acting from season to season upon the gaseous and fluid contributions to the life of the Tree, the whole of the wonderful work has been performed. Cylinder of sap-wood has been added to cylinder of wood; new liber and bark have been successively formed to make room for the increased growth and bulk of the stem and branches. Each year meanwhile the substance of the roots has been increasing. With the increase in bulk of the older roots, there has been augmentation in the number of foraging rootlets. Hosts of these have been annually

formed, and sent out to seek the greater and greater supplies of moisture, impregnated with chemical substances, required by increasing growth. Meanwhile, succeeding spring and summer have increased the breathing power of the Tree by multiplication of the number of its leaves, and consequent augmentation of the green surfaces on which the sun exercises its beneficent and wonderful power. By a wise provision of Nature, the exhaustion of the soil—by the rootlets—of the elements which have ministered to the life and growth of the Tree has been anticipated: for the fall of the leaves each year has brought decay to their tender and delicate framework, which has thus provided the surface soil with the very materials which have been carried up from beneath, and transmuted into the beautiful tracery of the foliage; and in due time, when the subtle operation of Nature called decomposition has been fully effected, the elemental substances of the leaves have, by the gentle influence of rain, been carried down once more into the earth.

Thus it is that, by the combination of these varied and beautiful forces of Nature, exercised

'Then it is that it most beautifully ministers to the healthfulness and happiness of man—providing him with shelter from the scorching sun during moments when its noonday heat is intolerable; with vital air to invigorate the lungs; with refreshing coolness from exhaled moisture; with sweet fragrance from leaf and flower; with fruit from an ample store; and with that inexpressible sense of pleasure conveyed to the mind by the contemplation of the beautiful works of the Almighty Giver of all good things.' [*Page* 89.

during periods of time which are not unfrequently counted by centuries, the Tree has, with gathering and continuous strength, reached the stage of its crowning pride and glory—perfection. Then it is that it most beautifully ministers to the healthfulness and happiness of man—providing him with shelter from the scorching sun during moments when its noonday heat is intolerable; with vital air to invigorate the lungs; with refreshing coolness from exhaled moisture; with sweet fragrance from leaf and flower; with fruit from an ample store; and with that inexpressible sense of pleasure conveyed to the mind by the contemplation of the beautiful works of the Almighty Giver of all good things.

# Chapter VII.

## BEAUTY.

'How beautiful is the awakening of Spring!'

[*Page* 99.

## CHAPTER VII.

### BEAUTY.

HOW ineffectual are our means of expression to convey to the listener or to the reader a sense of all that is comprehended in the beauty of Trees! We can by our prosaic methods, imperfect though these are, trace the life-history of a Tree so far as we can read and understand it. We can record and illustrate the systematic workings of Nature. We can explain from our own—a necessarily limited—point of view, what has been learnt by patient investigation of the direction and object of natural forces, as exhibited in the plant world—though even in our attempts to trace the

operations of Nature we are frequently lost in wondering admiration of the incomprehensible power and of the subtle and irresistible influence exercised by an unseen hand. But the mind falters in attempting even to grasp, much less to express, the idea of the absolute excellence, of the nameless and indefinable charm, of the deep sense of unutterable pleasure suggested by the presence of Trees.

Trees are always beautiful, and the exhaustless resources of the Creator have been bountifully employed to endow them with ever-changing qualities of loveliness—qualities which are nowhere perhaps more strikingly illustrated than in our own temperate climes, where the alternation of the seasons provides continual variation in the sylvan character of our landscapes. Yet it is difficult to know to what season to apportion the palm of crowning glory, because all the seasons are so beautiful; and it is so often forgotten when the eye perhaps impresses us with what appears to be exceeding beauty, and makes us momentarily feel how much that beauty—by mental contrast—seems superior to

'Then follows the Summer, with rich fulfilment of the promise of spring.'
[*Page* 100.

that of other seasons, that the present charm is largely due to the impressions produced by the seasons which have just gone, or to suggestions of the sylvan changes which are to come.

Is not the charm of Spring, for instance, largely due to our association of its budding foliage with the bare branches on which the green life of that foliage is first unfolded; to the present contrast of colours between dark limbs and boughs and twigs and glorious green, and to our remembrance of the sweet sleep—the hush, the calm—which have fallen on plant-life during the season of winter, the dream-season of deciduous plants? If it were not for the sleep we should not have the awakening, and the awakening would lose half of its charm.

And how beautiful is the awakening of Spring! Long ere we see the fulfilment of its green promise; long even ere spreading branches are covered with the budding precursors of their green life, there has been unseen movement within the Tree stems. The sap, the life-blood of the Tree, stirred into activity by the subtle force which throws its mystic influence over the plant world when

winter's sleep is wearing off, has been the gentle agent in this movement, and has commenced its ascending course. There has, then, as we have said, been awakening life long ere we have seen its effects. But these at length are manifest. There is gentle pressure from within at ten thousand points on bough and twig; there is swelling of the incipient buds; a bursting of their scaly sheaths; the sweet unfolding of gems of glossy green; the expanding of their incipient parts; and then a burst of verdancy, as Spring, in her full glory, flings her green mantle over the earth.

Then follows the Summer, with rich fulfilment of the promise of spring. The tender gold of the budding leaves is changed to the deeper tinge of glossy green, whose spreading surface has reached its full expansion, when Trees lift their glorious heads against the midsummer sky, and are musical with the sound of the midsummer breeze. And then upon the mass of their expanded foliage there is alternation of sunshine and shadow, giving to the delighted eye every shade of verdancy, with rapid change from silver

'Then Autumn comes,
"With less of sweet perfume, but mellower glory;"'

[*Page* 103.

hues to gold, from thence to brightest emerald, and on to deepest shades of green. There is continual movement too; for even in the greatest heats of Summer, when no breath of air appears to stir the foliage of other Trees, there is gentle motion in the leaves of Birch and Aspen with sparkle of the sheen of their bright foliage. Then there is the bloom on the blossoms of Summer—blossoms which are the sweet harbingers of the fruit, and touch the mind, through the eye, with a sense of abstract beauty.

Then Autumn comes,

'With less of sweet perfume, but mellower glory;'

and whilst we have the full perfection of this mellow glory in the fruit tinged with richest hues of colour, there is splendour in the leaves dyed with autumnal tints. How beautiful is the autumnal foliage of our woodlands! How great is the beneficence of the Creator to bathe the falling leaves in glorious colours, so that even the sad season of decay may give to the mind a new sense of the loveliness of Nature!

But Winter comes anon. The brightness of

spring, the glory of summer, and the mellow beauty of autumn are all gone. The leaves have fallen, and lie scattered and dead on hill-side and in hollow. Yet Trees are lovely still: for then we can see and admire, in full perfection, the exquisite configuration of the forms upon which the summer foliage clusters—the magnificence of their trunks and limbs, the graceful proportions of their branches and boughs, and the fine tracery of their twigs and sprays—defined, as we can often see them, with delicacy and beauty and with singular clearness against the blue expanse of a wintry sky.

'But Winter comes anon.'

[*Page* 103.

# PART II.

# BRITISH WOODLAND TREES.

## PLATE I.

1. Wavy-leaved Oak.
2. Flat-leaved Oak.
3. Ilex.
4. Ash.
5. Small-leaved Elm.
6. Wych Elm.
7. Beech.
8. Lime.
9. Ivy.

# British Woodland Trees.

## 1.

### THE WAVY-LEAVED OAK.

*Quercus pedunculata.*

PLATE 1, FIG. 1.

AMONGST all our woodland Trees the Oak is pre-eminent for the noble qualities of strength and endurance: and there is no other native Tree whose history is so closely interwoven as is that of this king of the forest, with the record of our national life—of its struggles, of its progress, of its development. Looking back to that early period when our island was covered from sea border to sea border, with almost unbroken woods, and reading on the page of history what has been gathered there by our

earliest writers, we see, standing out, as it were, vividly against the other inhabitants of ancient British woodlands, the noble and stately form of the Oak. A charming writer has appropriately said that this beautiful Tree is not *only* a Tree but 'a garden and a country.' It is a garden which offers a place to smaller plants, and provides a home for birds and insects, whilst in a broader sense it is a country with a history. Could the records of the plant, bird, and insect life inhabiting the Oak, made each year—spring, summer, autumn, and winter—during one century of the Tree's existence, be obtained for us, what a world of interest would be opened up before the lover of Nature! But the life of an Oak is extended over a period far longer than a century, enduring through events which make up a considerable portion of the world's history. Dryden says of this noble Tree,—

> 'Three centuries he grows; and three he stays
> Supreme in state; and in three more decays.'

And although this indicated term of nine hundred years, expressed as the limit of Oak life, may be

said to comprehend the average duration of the monarch of our woodlands, when growing, undisturbed under favourable conditions, there are recorded instances of Oaks which have lived beyond a period of fifteen hundred years.

Of our present woodland Oaks two are natives of Britain, and of these the most important is the one which forms the subject of this chapter. The generic name, *Quercus*, is compounded of two Celtic words, meaning 'a fine Tree.' The specific name, *pedunculata*, has been given to the present species on account of the circumstance that the fruit or acorn is born upon a slender and delicate *peduncle*, the name given to the stalk or stem upon which the flower or fruit of plants is borne—the acorn stem in this species being oftentimes several inches in length. The fruit of the Oak to be next described is, on the contrary, generally entirely deprived of a stem, and being what is termed *sessile*—a word derived from the Latin *sessilis*, 'sitting'—because it 'sits' without intermediate stalk upon its support, the specific distinctive name of *sessiliflora* has been given to it. Whilst most botanists

adopt this specific name for the Flat-Leaved Oak, some of their number designate the present species *robur*, instead of giving it the consistently distinctive name of *pedunculata*. The word *robur* is derived from a Latin word meaning strength, and would thus be applicable to Oaks in general, and would not be so clearly distinctive as the word *pedunculata*. It will be interesting to note in this connexion that the common English name Oak is derived from the Saxon *ac*, from which word we derive the name of the Oak fruit—the *ac* corn, or corn of the *ac*. Though *ac* has become, in modern English, Oak, the Saxon name is still retained in other words, as, for instance, in Acton, which is derived from Oaktown. To the ancient Greeks, no less than to the ancient Britons, the Oak was a prominent inhabitant of the forest; for the Greek word *drys*, although meaning generally a Tree, had especial reference to the Oak, and hence came the word dryads to indicate the fairy inhabitants or nymphs of the wood. From the Celtic word *derw*, meaning the Oak, came also the name Druids, the priests of ancient Britain, whose mysterious and cruel

rites were performed under the shadow of the Oak-Trees of Old England. The sacred groves of the Druids were all of Oaks. They planted and cultivated these Trees, worshipped under them, and sacrificed their victims under them. The Druids claimed the right to maintain perpetual fire, and once each year they compelled the people to put out all their fires; but permitted them to rekindle them from the yule log of the priests—this annual rekindling taking place on November eve, or the last day of October. The yule log was of Oak, and was kept burning on the Druidical altar—a stone structure erected under the spreading arms of the Tree which was the object of ancient British veneration and worship. The altar of the Druids—the 'cromlech'—was rudely formed of upright stones, with a stone or stones resting horizontally on the supporting ones, after the manner of a table. Whilst the stem of the British Oak was used for the yule log, the leaves of the Tree furnished the priests of ancient Britain with the chaplets, which were always worn on their brows during the performance of

their religious rites. The curious parasite of the Oak, the Mistletoe, was also, in British eyes, a sacred plant. As now, so in the time of the ancient Britons, the Mistletoe was not found growing plentifully on the Oak, and hence the search for it was a solemn and ceremonious proceeding, the Druids going forth—after the performance of certain rites, dressed in robes of white—to find it in their sacred groves, and provided with golden knives for severing it from the Oak. The judges, too, in ancient Britain administered justice under the spreading arms of the sacred Tree, the prisoners being compelled to stand within a circle drawn around the circumference of the stem by the wand of the presiding Druid. Following the customs which amongst the ancient Britons made the Oak a national Tree, the Anglo-Saxons had their popular gatherings under shelter of the monarchs of their woodlands: and from the time of Saxon England until now the noble Tree has, in ways innumerable, prominently figured in our history.

The strength and durability which give the Oak its pre-eminence amongst our woodland

Trees are qualities which are slowly gathered, for its rate of growth is ordinarily not more than enough to add one inch each year to its circumference. Yet its especial characteristic is stoutness, both of trunk and branch. It is not remarkable for height, though instances have been recorded in England of Oaks attaining a height of more than a hundred feet, with nearly seventy feet of trunk. The stoutness of its trunk, however, is usually its striking feature. It is wider at the base, and at the top of the trunk than it is midway, and this depression in mid-stem is formed by a symmetrical curve. The massiveness, solidity, and strength of the Oak bole are qualities which enable the Tree to bear the enormous superincumbent weight of its branches, and also to bear the peculiar strain caused by the habit of the latter in growing out to a considerable distance, almost horizontally from the top of the trunk. The twisting and contortion of its branches is another feature of its growth, and one which gives to old Oaks their gnarled and rugged appearance. Owing to its main or 'taproot' descending to a considerable distance in the

earth, and sending out, horizontally, powerful branches, it is enabled to take a very firm hold upon the ground. Hence it is found to be the least likely of all our forest Trees to succumb to the force of the tempest; and this tenacity is all the more remarkable, on account of the large surface which is presented to the wind by its enormous head of spreading branches. It was the form of the Oak trunk which suggested to Mr. Smeaton a model for the construction of his famous Eddystone Lighthouse, because of his belief that it was the form best calculated to resist the force of high winds.

The waviness of the surface, and of the large-lobed outline of the roughly oval-shaped leaf of *Quercus pedunculata* gives origin to the common name of the species. There is a tortuousness in the venation of the leaf of *Pedunculata* suggestive of the tortuousness of the Tree on which it is borne, and though in the early spring there is beauty in the tender golden green of its colour, it is not, and cannot be regarded by comparison with leaves of many another Tree, as a handsome leaf when it has attained its normal size, and its

colouring of sober green. The leaf-stem in *Pedunculata* is either entirely absent, or very short. One peculiarity connected with the foliage of the Oak is, that, though the Tree is deciduous, it sometimes experiences a second spring, when by accidental circumstances the leaves are prematurely removed. On the occasion of a great storm, which took place in Cornwall in the month of August, 1844, the foliage of a number of Oaks shrivelled up, and died a few hours after the storm. Very shortly afterwards, however, new leaves began to take the place of the old and destroyed crop. The same phenomenon has also been witnessed in the case of Oaks whose leaves have been destroyed by cock-chaffers, or other insects. Another peculiarity of the Oak foliage is that in young Trees it remains on the twigs long after the autumnal discoloration has set in, and it is supposed that in this way Nature affords protection from cold to the incipient buds which, in the Oak, as in many other Trees, are formed long before the time of opening. Following closely, in spring, on the opening of the earliest leaf-buds come the Oak flowers. These are of two

kinds, are greenish white in colour, and form what are called 'catkins.' The term 'catkin' will be referred to hereafter, and it may appropriately be defined in this place. A catkin, then,—to give it a general description—is a kind of spiked inflorescence, or system of little flowers: a cluster of tiny flowers, in fact, borne like a tassel on a delicate thread-like stem. It usually grows near the extremities of the Tree stem, and it hangs dependent from the twig on which it is fastened, drooping gracefully like fringe. The first Oak catkins, which appear, as we have said, almost contemporaneously with the first young leaves of spring, contain only *stamens*—the male organs of plants, furnished with the mysterious fertilizing dust or pollen. Then follow smaller and less conspicuous catkins, bearing the *pistils*—the female organs of plants—with their accompaniment of ovaries—the fruit or seed—which in the Oak, as we know, is the acorn. The rudimentary acorns on the seed catkins are, at first, tiny little bodies. When the stamen-bearing catkins have performed their office of shedding pollen, they drop from the Tree. But the acorn catkins

remain, and develope into the fruit—the beautiful 'corn of the Oak' seated in their elegant cups. In times past the acorn has served, not only for the food of many of the wild inhabitants of the woodland, but of man. What schoolboy does not remember the taste and flavour of the Oak fruit?

Not least amongst the characteristics of the Oak are its 'apples,' and its 'galls'—abnormal vegetable growths on stem, on leaf, and even on fruit, and about which there is much mystery. The Oak 'apple'—so called, is often beautifully coloured with shades of brown and pink, deriving its name from a rough resemblance to the fruit of the Apple-Tree. It is formed by the action of a small insect, which punctures the tender skin of the Oak twig, or sometimes the leaf-bud, and in the hole thus made by its ovipositor, it lays its eggs. This act disturbs the sap which flows from the trunk into the wounded twig, causing it to flow round the foreign substance of the eggs, solidifying as it flows, and encompassing the eggs with soft vegetable tissue, but leaving room enough for the grubs, which are soon hatched, become flies, make their way to the surface, and

take flight. Sometimes an ichneumon fly lays its eggs in the bodies of the enclosed grubs, and when these eggs are hatched, the resulting worms feed on the bodies of their predecessors, and themselves in turn becoming flies, make their escape from their vegetable house. The round Oak 'galls,' familiar to everybody, are formed in a similar manner by the action of insects, which perforate the Oak twigs. These galls, at first green, soon become brown, and the holes which are usually found in them indicate the passages by which the enclosed insects have escaped to light and air. The currant-shaped galls, known as 'flower-galls,' are made by the action of another fly, which selects, for the deposit of its eggs, the stamen-bearing stalks of the Oak catkins. When there are several of these little galls on one catkin the latter has very much the appearance of a bunch of currants; and it is a very curious fact that the existence of these galls prolongs the existence of the catkin stem, which, ordinarily, drops from the Tree so soon as it has shed its pollen. When, however, it is covered by flower-galls the catkin remains attached to the

twig on which it grew during the lifetime of the enclosed grubs.

Similar excrescences to the currant-shaped flower-galls are also found attached to the leaves of the Oak. But these—'leaf-galls'—are sometimes larger than the normal currant size, probably on account of the more abundant flow of the sap of the Tree into its leaves. An Oak bud is sometimes made the depository of an insect's egg, and then is formed a curious cone-shaped excrescence, to which the name of 'artichoke-gall' is given. Sometimes galls are formed on the trunk of the Oak, just above the ground, by an insect, and the leaves of the Tree are often covered by small red excrescences, called 'Oak spangles.' The acorn, too, is frequently punctured by an insect, and what is called a 'nut-gall' formed: but within every gall there is the enclosed egg, grub, or fly.

A volume might almost be filled with a description of the uses of the Oak as timber. In its qualities of hardness, toughness, strength, and durability, Oak wood excels the wood of any other British forest Tree. Other wood may be mentioned

which is harder, other which is tougher: but none which so excellently combines these qualities; and in the power of resisting decay Oak wood has no rival. A host of instances could be given in proof of the enduring qualities of Oak, and from these it may be safely deduced that in the same degree in which this noble growth of the forest retains its grasp upon life, its wood is endowed, when cut from the trunk, with the power of resisting the approach of decay.

## 2.

### THE FLAT-LEAVED OAK.

*Quercus sessiliflora.*

PLATE 1, FIG. 2.

OF our two British Oaks the palm of superiority is usually given, by those who regard only the qualities of the wood, to the species last described, although there is a difference of opinion, under this head, amongst experts in Tree knowledge. Even the claim for *Quercus pedunculata* of being the 'old English Oak' and indigenous to Britain has been disputed, and it has been alleged that the circumstance of *Sessiliflora* being less abundant now than *Pedunculata* makes it probable that the comparative

scarcity of the former is due to a higher appreciation of its qualities on the part of our forefathers. The Wavy-leaved Oak is, however, of slower growth than its rival, and as we find that it is slowness of growth that promotes the solid and enduring qualities of timber, it may be assumed, with some reason, that the qualities of toughness and endurance are likely to be more pronounced in the slower-growing *Quercus pedunculata*. The Flat-leaved Oak is a more beautiful Tree than *Pedunculata*. It grows straighter and more gracefully, in trunk, limb, and branch, than the wavy-leaved species. There is not the same contortion of limbs and boughs—for its branches all grow in more parallel planes, and its foliage is more symmetrically and evenly turned, and does not exhibit the sort of dishevelled appearance conspicuous in *Pedunculata*. Its individual leaves, too, are larger and brighter, more regularly lobed, more vivid in colour, and more glossy. There is more grace too in their venation—the veinlets, branching from both sides of the mid-stems, proceeding in straighter lines and with more regularity than is

the case in *Pedunculata*. The term 'flat-leaved' Oak, applied to *Quercus sessiliflora*, is not so suggestive of leafy beauty as that of 'wavy-leaved,' applied to the other species. But, in reality, the waviness of the leaf of *Pedunculata* arises rather from a ruggedness of surface—a quality characteristic of the Tree; for, in all ways, *Sessiliflora* has the handsomer leaf, whether we regard its individual beauty or the clustering compactness of the foliage as a whole. A prominent characteristic in the latter is the presence of leaf *stalks*—absent from its rival. But on the other hand, the acorn, as we have seen, is without a stalk, or at most, is provided with a very short and imperfect one; and hence the specific name of *sessiliflora*. It has been noticed, both in this country and on the continent of Europe, that *Pedunculata* is usually found growing on better soil than *Sessiliflora*, and this preference of the Tree for good soil will, perhaps, account for its more perfect growth, and for the superior quality of its timber. But what the present species may lose in the quality of its wood it gains in picturesqueness and beauty.

## 3.

### THE ILEX.

*Quercus ilex.*

PLATE 1, FIG. 3.

NATURALIZATION in Britain of many hundreds of years gives to the Ilex, or Evergreen Oak, the right to claim a place amongst our woodland Trees. Unusual interest, too, centres around this Tree, for the reason that it is probably identical with the Oak referred to in Scripture. Authorities, of course, differ on this point; but it is generally admitted, by those who are adverse to the belief in the identity of *Quercus ilex* with the Oak of the Bible, that the last-named species at least

closely resembled our English Tree—proof of the similarity being furnished by the fact, that the existing Oak of Palestine very nearly resembles the Ilex. Though its descriptive name of 'Evergreen Oak' might suggest the possession of qualities exceeding those of the monarch of our woodlands, it is not by any means so noble a Tree, though it does oftentimes attain a great size and a great age. Neither in habit nor foliage is it at all like our native Oak, but it bears the distinctive acorn, though the latter, in shape, differs from the acorn of the sacred Tree of old England, and it sits, moreover, in a scaly cup. The fruit, however, of the Ilex takes two years to perfect. A curious fact concerning the Ilex acorns is, that sometimes the same Tree will bear both bitter and sweet ones, the latter being edible and pleasant to the taste. The leaves have a sort of general resemblance to those of the Holly, being, like the latter, of a dark glossy green, with prickly or sharply serrated edges, though they vary very much,—and not unfrequently on the same Tree—some being almost even of edge, others being sharply serrated, and

others again being furnished with sharp spines like the Holly; although it is generally noticed that, when the leaves vary in the character of their outline on the same Tree, it is usually the lowest branches which have the most prickly leaves. The general resemblance of the Ilex to the Holly, in the form of its leaves, has suggested the name, sometimes applied to it, of the Holm or Holly Oak, but when spined, the spines do not stand out in alternating directions, as in *Ilex aquifolium*. The venation in the roundish-oval, slightly-stalked leaf of *Quercus ilex*, is arranged with beautiful regularity, the veinlets running in oblique and parallel lines from the mid-vein to the margin, and proceeding to the points of the marginal spines, or to the apices of the marginal serratures. The venation is most conspicuous on the whitish downy under-sides of the leaves. The evergreen persistence of its foliage renders the Ilex a beautiful inhabitant of the woodland, and enables it to contrast pleasantly with the bare outlines of leafless branches.

Ilex wood is useful where hardness, flexibility, and durability are required; hence axle-trees,

mallet-heads, pins, and wedges are made of it. The same qualities render it a desirable wood for making the stocks of tools, for palisades, and for use in fortifications. It is also used for the manufacture of chairs, and it furnishes an excellent charcoal.

Though the Ilex is easily grown from its acorns, and is a rapid grower in its earlier days, it is not easy unless great care be exercised to transplant it successfully. But non-success in this arises chiefly from ignorance of the peculiar character of its root-growth. Its roots, instead of spreading horizontally, descend deeply into the earth, and being furnished with root hairs,—the indispensable agents of all plants —chiefly at the root extremities, there is a danger that these will be torn off in transplanting. It would be difficult, and almost impossible, to avoid this in removing a Tree of any size. But a very young Tree would thrive if very carefully moved, especially if it were grown in a large pot, or other contrivance, whereby root, rootlets, and soil could be moved without disturbance. These suggestions as to

growth and transplantation are desirable for the reason that this Tree has a kindly disregard of the smoky atmosphere of our towns, and it may be selected with advantage to add its evergreen beauty to maintain the verdancy of sylvan streets.

## 4.

### THE ASH.

*Fraxinus excelsior.*

PLATE 1, FIG. 4.

VIRGIL'S tribute to the gracefulness and beauty of the Ash in the line

'Fraxinus in sylvis pulcherrima.'

has found ample endorsement in our own days; for this Tree has been called 'The Venus of the woods:' and it has undoubtedly as good a claim to this appellation as that claimed for the Oak, as being 'the king of the forest.' And by its fondness for the streamside, for the crests of inaccessible crags, for some jutting point of the steep upland, or for the

conspicuous vantage-ground of some crumbling ruin, it is enabled by its preference for a shallow soil, to display the lightness and grace of its foliage to perfection. It can bear no rivalry, and hence it speedily overtops the other growths of the woodland, rising oftentimes to a considerable height. Not only does it grow readily from seed, but it also developes very rapidly, especially if it should be in good, rich and somewhat chalky soil, in which it delights, and by the margin of some lake or river. Its roots have a peculiarly horizontal method of growth, creeping to a considerable distance outwards from the Tree trunk; and as they are thick and fibrous and come very near to the surface of the ground, there is little chance of any other vegetation growing under the shelter of its branches. On this account it has been supposed, but erroneously, that the 'drip' of its leaves is detrimental to vegetation.

Some time before the leaves of the Ash appear in spring—and it is the latest of our woodland Trees in leafing, seldom unfolding its foliage until the end of April or the beginning of May—there is produced from the sides of the branches of

the previous year a number of purple-coloured floral clusters. They are conspicuous on account of the absence of foliage, and because of their number, but they have neither calyx nor corolla. They are provided with stamens and pistils, the latter being the rudimentary pods or 'keys,' as the seed-vessels of the Ash are called. Upon fertilization by the instrumentality of the *anthers*—the pollen-bearing vessels of the stamens, the flat ovaries, or seed-vessels—each one of which is placed between two anthers—begin to enlarge; but after they have attained their full growth and become flat, wing-like bodies, they still remain attached to the Tree, until later in the year they are carried away by the force of high winds. The leaf of the common Ash is peculiar in shape. It consists of an arrangement on a single stem of five or six pairs of leaflets, with a single leaf at the top, placed in a line containing the main leaf-stem, and almost at right angles with the direction of the other leaves. Sometimes, however, a terminal leaflet is not present. The individuals of each pair of leaves are set on the stem exactly opposite each other, their shape being

oblong, blunt at their bases, but drawn out to rather acute points at their apices. The arrangement of leaflets makes the leaf what is called pinnate or feather-like—that is to say, the leaf is cleft to the mid-stem, like the parts of a feather are cleft to its quill. It might, however, be contended that each leaflet—which is generally distinctly stalked to its mid-stem—is a leaf itself, instead of being merely a part of a leaf. The venation of the leaflets—as we shall here regard them—is very distinct, consisting of a prominent mid-vein running through their centres, with veinlets running diagonally, and in very regular parallel lines to the leaf margins. The colour of the leaves of the Ash is a light green; and as they are the latest in appearing in the spring, so they are amongst the earliest to disappear in the autumn—turning as they wither to a dull brown, and sometimes when autumnal winds are high, disappearing almost suddenly—or within a very short time—from the Tree. Hence the Ash rarely has the autumnal beauty of most of our woodland Trees, though occasionally its leaves are coloured with rich tints of yellow. The time of the fall of the leaf varies

in different individuals, some being earlier than others. There is variation also amongst Ash Trees in the capacity for seeding, some individuals producing a much greater profusion of seed than others; and it is noticeable that those Trees which have little seed have usually a finer display of foliage: the drooping character of which gives a very graceful aspect to this beautiful Tree, enabling it in summer to present a light and airy contrast—by the easy sweep of its boughs—to the denser foliage of other Trees. The bark, more especially of young specimens of Ash, is of a light or ash colour, and it has been supposed that it is this circumstance which has originated the common name of the Tree, although the soundness of this supposition has been contested.

The usefulness of the wood of the Ash makes it a Tree of great value; for notwithstanding its rapidity of growth, its timber is famous for its toughness and elasticity, qualities which, in combination, are very essential for many economic purposes. It is a curious fact, illustrative of the rapidity and perfection of the growth of *Fraxinus excelsior*, that the wood of a sappling Tree, not

more in circumference than nine inches, is as mature and consequently as durable as the wood of a much older Tree. Its wood was formerly used for bows and spears, and is now used for making amongst other things axle-trees, carts, ladders, oars, plough-stocks, pulley-blocks, tables, and tool-handles. It also makes the best 'buts' for fishing-rods. Indeed for any purpose in which combined toughness and elasticity are essential, this valuable wood is used. Apropos of the uses of the Ash it may be mentioned that its 'keys' were at one time valued for their medicinal properties, and were also gathered when green and tender, and preserved with salt and vinegar, and thus made to serve as a table delicacy.

It is the wing-like nature of the seed-vessels of the Ash which accounts for the presence of the Tree in strange and elevated positions; for it is their lightness which causes them to be dispersed and carried to great distances by the agency of the wind; and it is to this beautiful provision of Nature that we owe the presence of these beautiful Trees in positions where their graceful foliage can be displayed to the greatest advantage.

## 5.

### THE SMALL-LEAVED ELM.

*Ulmus campestris.*

PLATE 1, FIG. 5.

THE Common, or Small-leaved Elm is perhaps, of all our woodland Trees, the most stately. Yet to an English mind, this beautiful Tree is more suggestive of cultivated woodland than of the forest. It is, too, a familiar and a homely Tree, seeming to prefer the neighbourhood of man, and to thrive especially in those artificial boundary-lines, which in rural England we call 'hedges.' There, unfortunately, owing to the necessities of the husbandman, the Elm is usually sadly shorn of its beauty by the practice of

lopping off its lower branches, which are replaced by a clustering array of small boughs or twigs that, with their accompaniment of summer foliage, enshroud the Elm-trunk, whilst the Tree-head alone, above the reach of the wood-lopper, spreads out against the sky its wealth of green beauty. Unspoilt, however, by the ungainly work of the pruner, the Elm is a noble Tree, and were it undisfigured by the lopping agriculturist, would make sylvan splendour in our monotonous hedge-banks, and bosky avenues, rich in beauty, of the dry and dusty roadways, dividing domain of corn-land from domain of cornland. Yet in many a spot in rural England *Ulmus campestris* is still left to us in the pride of its glory, forming lofty arcades of rare beauty, with a grandeur in the upward sweep and gradual spread of its noble branches, that can only be understood by those who have seen this stately inhabitant of our woodlands in its full glory. The Crawley Elm, rising seventy feet high, with a girth of sixty one feet at the ground; the Elm at Sion House rising a hundred feet; the Elm at Longleat, and the one at Croft Castle, Herefordshire, both reaching a

height of a hundred and twenty feet, are examples of noble growths to which the lover of Trees is referred, whilst it is satisfactory to know that Elms with a diameter of five feet at five feet from the ground, are not uncommon in congenial situations.

Though this beautiful Tree may not be indigenous to Britain, and may not indeed, as some authorities believe, have been introduced so early as the period of the Roman invasion, a residence with us of much more than a thousand years has sufficed to endear it to the hearts of English people; for, as the Quarterly Reviewer referred to in a previous chapter has justly said, the Elm since its acclimatisation amongst us, in, as he believes, the days of the Saxon Heptarchy, 'has contributed more than any other Tree save the Oak to the charm of rural England.' How closely it is associated with our urban and suburban life is shown by the fact that this familiar Tree has given its name to not less than forty places in England. Such are, for instance, Barn Elms, Elmley, Elmstree, and Nine Elms, whilst 'Elm dales' and 'Elm groves' are encountered in large numbers

in the Elm country, and the instances are past counting in which town and country dwellings have been called after this beautiful inhabitant of our rural districts.

Upon the twigs, made bare by the wintry cold, the Elm-flowers cluster on spring's arrival, ere the tender bud of the coming leaf has opened. In little bunches, like a cluster of scaly buds, but purple-tinted, the blossoms grow. Stamens, with fructifying pollen, intermingled with pistils, which anon develope their one-seeded ovaries. These grow into thin green plates, like wings, notched at their upper and broader ends. And wings they are; for when the little seeds, encased in their thin green caskets, are ripe, they take flight with the first high wind, and flutter to the ground. Then, upon the turn of the Elm-fruit harvest, when the harvester—the first fresh breath of spring—has done his work, the leaf-buds open with hue of tenderest green. How beautiful at this season of leafage is the Elm! Who has failed to admire and enjoy, during a ramble on foot, a ride, or a drive, on a bright spring morning, through the winding roads of sylvan

England, the delightful contrast afforded by the soft burst of verdancy along the dark lines of the spreading Elm boughs? The beautiful proportions of bough and twig are lost in the glorious profusion of summer leafage. But the beauty of the wintry form—stem, branch, bough, and twig—are seen in lovely spring in gentle association with the tenderest hue of expanding foliage.

The leaf of the Small-leaved Elm, the subject of the present chapter, at first, as we have seen, of a light and tender hue, becomes as summer advances of a dark green colour. It is somewhat pear-shaped, pointed at its apex, and acutely serrated around its margin. Its striking peculiarity is the inequality of its base, owing to the dividing mid-vein separating its leafy portion into two unequal parts, the margin of one part being carried lower down the mid-vein than the other, which, falling short of the length of the complementary portion, leaves the mid-vein bare. The surface of the leaf on both sides is usually somewhat rough or crumpled: the venation, however, on the under-side being very distinct, the veinlets diverging on each side of the mid-

vein in oblique and parallel lines to the leaf-margin, near which they are occasionally forked.

It is a curious fact that the Small-leaved Elm is rarely propagated by its seed, which in this country does not appear to ripen sufficiently to admit of its growing. The Tree is, however, multiplied by its suckers, which grow abundantly around its trunk, thrown up by its surface-roots. It grows to a great age, as great sometimes as five or six centuries; and under the most favourable conditions, and when growing freely in its natural state, it requires a century and a half to arrive at its full perfection. Those who desire to have Trees surrounding them where no Trees have before existed, and who yet do not wish to wait during the long interval which is necessary for the development of a sapling, will be glad to learn that an Elm can be transplanted at an age greatly beyond the usual term of transplantation.

At one time it was customary in England to feed cattle with Elm leaves, and this practice is still adopted abroad. The wood is of a fine grain, hard, heavy, and tough, being especially useful for purposes that require it to be frequently brought

into contact with water. In our dockyards, therefore, it is valuable for many purposes, as for the keels of vessels, and for those parts of a vessel which are the most exposed to the action of water. It will admirably withstand alternations of dry and wet, and is useful, for instance, for pumps, troughs, water-gates, and water-wheels. The inner bark also of the present species provides bast for mats and the material for ropes.

*Ulmus campestris* is late in succumbing to autumnal influences, and as it retains its foliage until late in the season, turning meanwhile into rich hues of yellow, it helps to add a charm to the autumnal woodland.

## 6.

### THE WYCH ELM.

*Ulmus montana.*

PLATE 1, FIG. 6.

MUCH larger in leaf than *Ulmus campestris*, the Wych Elm is also distinguished by other and very decided qualities from the small-leaved species. It is much less upright and stately in growth, its branches having a spreading and drooping habit altogether foreign to the last described. Whilst *Ulmus campestris* is sometimes called 'the English Elm,' *Montana* is often known by the name of 'the Scotch Elm,' notwithstanding that the latter has a greater and more certain claim to be ranked as a native of

Britain than the former. No better description of the leaf of the Wych Elm could be given than to compare it with a magnified leaf of *Ulmus campestris*. There is the same colour and shape, the same system of veins, the same kind of serratures on the leaf-edges, and the same roughness of surface also on both the upper and under sides of the leaf of *Montana*. The differences, however, in the two Trees, apart from the primary differences of growth and habit, are very curious. *Montana* has no suckers for propagation. But they are not necessary, because the Tree will easily grow from seed, which becomes ripe in the early days of June. Unlike *Campestris*, the foliage of the Wych Elm does not linger into late autumn with mellow tint of richest yellow to gild the landscape. It dies speedily, at an earlier date than that of *Campestris*, its leaves curling up and becoming of a dull brown colour.

Its particular uses, too, give the wood of this Tree an individual value, though its rapid growth detracts somewhat from the quality of its timber. This, however, is used for many of the purposes which Ash wood serves, being particularly useful

to the millwright and the wheelwright. The term 'wych' indicates, it is believed, one of the uses to which it was formerly put, namely, that of making boxes or chests—wyche being the old name for a chest or box. A noble specimen of the Tree may be seen near Roxburgh, in Teviotdale, a Tree—the famous 'Trysting Tree'—which at four feet from the ground measures thirty feet in circumference. Another Tree, near Chepstow Castle, measures thirty-six feet in girth at four feet from the ground.

## 7.

### THE BEECH.

*Fagus sylvatica.*

PLATE 1, FIG. 7.

PERHAPS the fact that none of our woodland Trees grow more readily from seed, or show a readier disposition to thrive and develope on English soil than the Beech, may be accepted as at least one circumstance in favour of the claim made to rank this beautiful Tree amongst the natives of Britain. Those who do not regard it as indigenous rely chiefly, if not entirely, on the statement of Julius Cæsar, that timber of every kind which was found in Gaul, also grew in Britain, except the Beech and the Silver Fir. But

such testimony must be taken to be of little value if it be remembered that Cæsar could have seen but a small portion of our island, which at the time of the Roman invasion was densely wooded; and that even had he gone far inland he could not easily have assured himself of the absolute truth of his statement. Those who know how sometimes for centuries plants and shrubs escape the search of the most enterprising of botanists, will not give much heed to the result of Cæsar's hasty survey.

From its preference for a chalk soil this magnificent inhabitant of our woodlands is found in greatest abundance and perfection in the chalk districts of England. The charming wood called Mark Ash in the New Forest contains some of the most beautiful forms of Beech to be found anywhere in Britain; one noble Tree in that wood having a girth near the ground of more than twenty-four feet. But the grounds of Newbattle Abbey, near Edinburgh, produce a Beech of nobler dimensions, for it is considered to be the largest Tree of its kind not only in England but in Europe. It is a hundred feet in height, covers

by the overspread of its branches a space of ground a hundred and twenty feet in circumference; and its bole at two feet from the ground measures thirty-three feet in girth. In these, the largest of our woodland Beech growths, the striking and impressive character of the Tree can of course be most effectively recognized. The straight pillared stem, smooth and grey, rises with lofty symmetry, sometimes in a single column, sometimes in double columns, and far up aloft spreading out against the sky, a canopy of graceful foliage. The beautiful and impressive character of the Tree is best seen, however, in a Beech wood; for the Beech allows no rivals, and even underwood and turf are banished from the shade of its branches. Looking up, then, in a great Beech wood from the withered leaves which are strewn in profusion on the ground, giving it a character of lifelessness, and letting the eye wander amidst the forest of symmetrical trunks carried up aloft with surpassing grace and beauty until they spread into the heaven of leafiness above, one is strangely moved by the spectacle; for the wealth of verdure burnished into silvery

gloss by the play of sunlight, tells us of the unseen but potent forces which beneath our feet, where the soil is embrowned by dead leaves, are moving silently upwards through the stately columns, carrying to their summits the life and vigour which give symmetry to stem and branch, grace to clustering bough and twig, and the beauty of colour to the moving forms of glossy leaves.

The Beech leaf shares with the Tree itself its grace, symmetry, and polish. Enclosed in its bud—formed in late autumn and then encompassed by its brown protective sheath—it is wrapped in a soft, silky mantle of silvery down. And when the tender incipient leaf emerges from its fairy covering, with its hue of golden green, it, too, is fringed along its edge and lined along its veins with silky down. Then with the young leaves the clustered fruit appears in rounded downy bunches, stamen with complement of pistil—male and female. The floral stamen, its work performed, retires, leaving place for the development of the ovaries in their protective prickly cases, with their four-celled compartments,

enclosing the rich, brown, triangular fruits—the beech-nuts familiar to the schoolboy. The silky down on the incipient leaf gradually disappears as spring advances, and anon the leaf developes into its mature form and colour. In shape it is oval, pointed at the top, and fastened to the twig by a short stem. The venation is beautifully regular, and can be very distinctly seen on the under part of the leaf. On each side of the mid-vein, which is a continuation of the leaf-stalk, and proceeds in a straight line to the apex, veinlets branch in parallel lines to the unindented, but somewhat wavy leaf margin. The leafy substance is thin and hard, and beautifully polished on its upper surface; and when it has arrived at perfection it assumes a rich hue of green.

One peculiarity that must be noted in the Beech seed, or 'mast,' is that it does not long retain its capacity for germination; so that unless it be sown not later than the spring succeeding the season of its ripening, there can be no certainty that it will grow. The 'seed leaves' are remarkably pale in colour when they first appear above the ground. In ten years from planting the nut a young Beech

will ordinarily have attained a height of about twenty feet. Its development continues for a further period of from fifty to seventy years; and though it generally grows for a much longer period, reaching not unfrequently an age of a century and a half, it reaches its prime at from sixty to eighty years of age. In young Beeches Nature beautifully provides for the protection during winter of the autumn-formed buds, by retaining the previous years' foliage on the boughs. Though the Holly will grow and even thrive in Beech woods, the neighbourhood of these Trees is unfriendly to other forest growths. They surmount all the surrounding Trees, and it is believed that when Oak and Beech have grown together the Beech has sometimes exterminated the Oak. The 'drip' from the leaves is supposed to be detrimental to vegetation.

There are, however, two species of edible fungi —morels and truffles—which are found growing in Beech woods.

The green wood of Beech is much heavier than the dry timber. It is indeed heavier when green than that of any other of our woodland Trees; but

when dry its weight is less by one-fourth. It is then of a very light colour, and is used for the manufacture of articles of furniture, and for a variety of other purposes.

A curious habit of the Beech limbs causes them, when they chance to cross, to grow together; and when thus united they often present a strange appearance, which adds an element of interest to the attractions of a Beech wood.

## 8.

### THE LIME.

*Tilia Europæa.*

PLATE 1, FIG. 8.

IN a previous chapter we have discussed some of the prominent characteristics of this delightful Tree. Here we shall give, for those whose interest may perhaps have been excited by our reference to one of the most beautiful of the inhabitants of wood, park, and garden, such details of its life, history, and peculiarities as may not lie within the knowledge even of those to whom the form of *Tilia europæa* is like that of a familiar friend. It was 'a study of young Limes' which formed the subject of the

Lime chapter in 'Trees at home'—of Trees which had just passed beyond their sapling stage, and entered upon the full glory of their young Tree-hood, if this expression may be allowed. But the Lime, though it may not compare in stature with our finest woodland growths, nevertheless attains the dimensions of a noble Tree; for a Lime at Moor Park in Hertfordshire has a stem which measures, at four feet from the ground, no less than twenty-three feet round, and rises to a height of a hundred feet from the ground, making a head of foliage a hundred and twenty feet in diameter. Another Tree at Longleat, having a circumference of thirteen feet at the same distance from the ground, is a hundred and thirty feet in height. The Lime, too, will come into the front rank of competitors for the palm of longevity; for there are instances on record of its having reached the great age of five or six hundred years, whilst the age of an enormous Tree, having a circumference of thirty-six feet, growing near Fribourg, is said to be nearly a thousand years! To all students of botany it may be interesting to know that the name of the great Linnæus was derived from

the Swedish *Lin*, meaning the Lime or Linden Tree.

Of the Lime leaf we have already spoken, but it remains to discuss its blossom. Those who at midsummer have looked up into its glorious head of foliage cannot have failed to see the delicate clusters of golden green balls suspended from their slender verdant stems, branching stems from the summit of a main stem forming what botanists call a *cyme*, somewhat like the arrangement of flowers in the familiar Elder-Tree. But the Lime blossoms do not grow with the density of the Elder flowers. They are numerous collectively by the great number of their cymes. But each cyme has usually no more than seven or eight little green balls depending—for that is their usual habit—from seven or eight short stems joined at their bases to the one supporting stem. And this main stem, in its turn, depends from the centre of a *bract*, which in the Lime is a long, thin, narrow, and very pale green leaf, roughly suggesting the 'keys' of other Trees. It is, in fact, a kind of abnormal leaf which springs from the *axil*—or angle made by a leaf stalk with the twig on which the leaf stalk is fastened—of

the other leaves. Through the bract a mid-vein runs, starting from the short stalk which connects the infloresence—stem bract and cyme—with the Tree, and proceeding to its rounded apex; and it is from near the centre of this mid-vein that starts the cyme, forking out and away from the membranous bract. Look against the light at this pale-green sheath now open, and you will see the delicate veinlets that beautifully branch and fork from the mid-vein, and the perfect system of reticulation!

But anon you pass under the Limes and the green balls have gone, for they have opened into floral crowns, green honey-cups diffusing sweetest odours, and offering honey to the bees! The five-petalled flowers give place to five-celled seed-vessels, and in due time, when the ripening comes, the wing-like bracts bear away, on the bosom of the wind, the germ-containing caskets—the microscopic storehouses of future Trees.

From the beauty of the Lime pass we to its usefulness; and first, as to its leaves and flowers. These have been used as medicine, the former for fomentations, and for other healing purposes—for

beautifying the skin by decoctions, and for promoting the growth of the hair; the flowers—infused—as a remedy for colds and fever. Gum, oil, sugar, and tannin are also extracted from the flowers of the Lime; and tea and sweet liquor, one resembling chocolate, can also be made and manufactured from them, whilst the bees obtain from the same source the materials for their finest honey. From the inner bark is obtained the material known as bast, used for mats and for tying plants in gardening; whilst in olden times Lime bark was used as writing material. Lime timber, from its disinclination to warp, is used for the sounding boards of musical instruments; whilst for many articles of furniture its lightness and delicate colour render it especially suitable. To the wood engraver, too, it is valuable, furnishing him with a material which, delicate to the touch of his graving tools, permits of the most beautiful and faithful delineation.

Opinions differ as to the indigenousness of the Lime, though the weight of belief is in favour of its being a native of Britain. In walk, avenue, square, and park it is most sweetly familiar to

us, and over the whole of Europe its beautiful adaptability for association with man has long been recognized. Though the early decay of its foliage fills the mind with sad recollections of its early beauty, there is still a charm in the richness of its departing hues.

## 9.

### THE IVY.

*Hedera helix.*

PLATE 1, FIG. 9.

EVERGREEN in beauty, there is a persistent charm in the Ivy. Nature indeed, by the aid of this beautiful plant, seeks to clothe the bare places of the earth, to impart greenness to decay, and to fill many a corner where the sunshine never comes, with glossy verdure. We have ranked the Ivy amongst our woodland Trees; for though, perhaps, the popular idea of a Tree excludes what is not robust and self-supporting in the vegetable kingdom, yet this present growth may claim Tree honours; for

though it cannot rise unless it clings to upright forms, with such support it makes, from a goodly stem, a mass of foliage not unworthy to rank with the spreading wealth of Tree verdure. And what the Ivy takes from its supporters, it often returns a thousandfold. For what is dead strength compared with life? What the bleak, rocky mass, the immovable rampart, or the giant Tree-trunk firm in death, compared with the charm of mantling greenery? If the creeping, glossy evergreen borrows the support of these objects, it covers them with its fresh life. And with kindness to man Nature lends her Ivy wreath to give beauty even to the crumbling ruins of his walls.

The Ivy is inconstant in its moods, and changeful in the hue and in the size of its leaves. A stem of varying lengths, often purple tinged, gives origin at its apex to the cellular expansion of the evergreen leaf, the stem entering the latter, where a deep depression in mid-leaf causes a bay in the contour line of the under margin. The leafstalk, where it enters the three or five-lobed leaf, gives origin to veins, which vary in number

with the leaf lobes, and proceed through the latter to their pointed apices. From these principal veins there is a most beautiful system of contorted veinlets reminding one as the leaf is held against the light, of the branching form of the Oak, and suggesting an endeavour, on the part of the Ivy leaf, to adapt its form to the noble Tree against whose trunk and branches it so often clings. Along the Ivy stem are the tufted fibres, by which it clings to its supporting objects. But when it is recumbent, it is not these fibres that are brought into requisition, but roots which spring from opposite the leafy axils.

The late autumnal blossoming of the Ivy produces its clusters of flowery cymes—each flower five-petalled with five stamens and a pistil; and anon the rounded berries come, providing food for many of the woodland songsters, including blackbird and thrush, as well as for the swift-winged wood pigeon.

Even Ivy has been useful—in India—as a medicine, which is extracted from its juices, and is called hederine. Its roots furnish a strop for sharpening knives, and even its incipient leaves

have at times furnished food for deer and sheep.

The delightful evergreen has no dying glory in autumn; for it is then that it bears its brightest hues of glossy green, showing that Nature which, in our climate, withdraws so much of her verdancy to prepare for the green beauty of the succeeding vernal season, yet leaves us something to refresh the mind, through the eye, with the sense of colour.

## 10.

### THE CHESTNUT.

*Castanea vesca.*

PLATE 2, FIG. 1.

FRESHNESS and richness of leaf and sweetness of fruit, as well as breadth and beauty of trunk, are the prominent characteristics of this handsome Tree. Its fruit, indeed, is more familiar than the Tree itself; for the poorest of city children, to whom 'the country' is *terra incognita*, and who have never had any opportunity of visiting either park or garden where *Castanea vesca* is to be found, are intimately acquainted with the form and taste of the eatable Chestnut. Whether this beautiful Tree

## PLATE II.

1. CHESTNUT.
2. HORSE CHESTNUT.
3. WALNUT.

is or is not a native of Britain, is a point that will probably never be settled, though general opinion inclines to the belief that it is not indigenous, but must have been introduced into our island by the Romans, who, it is considered, probably brought it here because of its possession of that which, in the present day, makes it chiefly valuable to us—namely, its edible fruit. It was at one time believed that the timber found in a large number of our most ancient buildings was that of the Chestnut; and upon this supposition was founded a belief in the indigenousness of the Tree. But it has since been discovered—and the French naturalist Buffon was the first to call attention to the subject—that there is a great resemblance between the wood of the Chestnut and that of the Durmast Oak (*Quercus sessiliflora*); and, upon further investigation, it was found that the wood in our ancient buildings, supposed to be from the Chestnut-Tree, was, in reality, from *Quercus sessiliflora*. The beautiful roof of Westminster Hall is amongst the old wooden structures supposed to have been built of Chestnut wood, though now known to be constructed of Durmast

Oak. Indeed, it is known, that although the Chestnut produces good timber up to an age of from thirty-five to forty years, and may extend its limit of utility to a period of half a century, yet, after that age, the wood becomes very inferior, by the loosening of its texture, that supervenes after it has passed its jubilee.

Yet the Chestnut lives to an enormous age; and, perhaps, the Tree of this species, which still exists on Mount Etna, is one of the oldest Trees in the world, as it is certainly one of the largest—for it reaches the enormous girth of two hundred and four feet! At first sight, this colossal Chestnut appears not like one Tree, but like a group of several, as part of the trunk has been broken away, and its interior is hollow, and large enough to find room for a flock of sheep, or to admit of two carriages driving abreast through it. This magnificent Tree still bears abundant fruit, and its collectors have built a hut within the trunk, the better to promote their proceedings. In England, though we have no Tree at all approaching in size to this vegetable colossus of Mount Etna, we have some noble specimens of

*Castanea vesca.* At Croft Castle there are Chestnuts eighty feet in height, and having a girth of twenty-six feet; and there is one at Tortworth, having, so long ago as the year 1721, a girth of fifty-seven feet, and it has now, at four feet from the ground, a circumference of sixty feet, or nearly seven yards in diameter, though it is by this time almost a 'sylvan ruin.'

The Chestnut thrives in deep sandy loam, in the soil, especially, of rich loamy valleys, where it grows with rapidity. It does not thrive in stiff or heavy soil, and when this is not present, the nature of the soil in other respects is not of very great importance, though it is to be noticed that it attains height in deep good soil, and breadth in shallower poorer soil. The Chestnut woods, with Trees of enormous growth, found on the sides of Mounts Etna and Vesuvius, appear to indicate a strong preference of this magnificent Tree for the ashy substances thrown out by volcanic action.

Very beautiful in its depth of glossy green is the Chestnut leaf as it hangs from the spreading Tree. It would be largely tongue-

shaped, but for its beautifully indented margin, the points of the broad serratures being furnished with spines. The mid-vein, continuing the short leaf-stalk, passes, with a very gentle curve, to the leafy apex, and gives origin on each side to veinlets, which, running diagonally and almost parallel with each other, proceed to the points of the serratures. The flowers, which open about July, are borne on long catkins or spiked clusters, nearly of the same length as the leaves, and it is on the lower part of these green spikes that the incipient nuts appear. Every one who has walked into a Chestnut grove in the fall of the year, is familiar with the rounded prickly balls, like tiny green hedgehogs, enclosing the brown shiny nuts. It is for its fruit that the Chestnut is principally cultivated and esteemed; for the sale of the pleasant and edible nuts gives rise to an active industry.

There is rugged beauty in the stem of ancient Chestnuts. There is a charm in the glossy leaves of this noble Tree, and with the rich hue of its glossy fruit is associated the deep golden glow of its autumnal foliage.

## 11.

### THE HORSE-CHESTNUT.

*Æsculus hippocastanum.*

PLATE 2, FIG. 2.

UNLIKE its namesake, the sweet Chestnut, in most essential points, *Æsculus hippocastanum* is like the former in the general shape and appearance, though not in the taste, of its nut. It is not claimed as a native of Britain; but it has been with us about three hundred years, having been brought here, it is believed, about the middle of the seventeenth century, and has now made itself a very familiar friend. For beauty of leaf and blossom it is chiefly prized, as its timber is accounted of little value. But its

nuts, though bitter, and unfit for human food, are of some value for other purposes. They are eaten by deer and by sheep, both of which take them readily, and by horses. They are believed to impart a rich flavour to the flesh of sheep, which eat them largely. The nuts are ground for horses, and also used for them as medicine, and hence, according to a popular belief the common name of the Tree, although similar names are not unfrequently applied to other vegetable productions which are not desirable for human food. When boiled, the nuts have been sometimes given to poultry: as a powder mixed with one-third of its bulk of wheaten flour, it is said to make more excellent paste than wheaten flour alone; and in the jelly formed from the nuts in a decayed state a sort of soap has been furnished. As material for packing-cases the wood of this Tree finds a not very exalted use. The bark has found employment as a medicine as well as for tanning, and for the manufacture of a yellow die.

But though commanding admiration by its shape and size, rising with a spreading head of foliage, and with an erect trunk to a height some-

times of sixty feet, its charm is found, as we have said, in leaf and flower; and let us add, in its beautiful form, when in its wintry undress. In winter indeed, it derives additional beauty from the fact that its buds, formed when the previous summer foliage has begun to wane, have become expanded at the top of every twig, ready to burst on the first touch of spring. A remarkable and deeply interesting discovery was made by a German naturalist who once, in midwinter, dissected a bud of the Horse-Chestnut. The bud was not greater than the size of a pea. The brown gummy covering—which will be always noticed on the buds of this Tree in winter, and which furnishes protection against our frosts to the tender enfolded leaf—consisted, it was discovered, of not less than seventeen scales wrapped one upon the other and cemented together. Underneath this elaborate system of envelopes were the microscopic forms, nursed under a soft downy covering, of four leaves, in the centre of which was the incipient flower spike. Bringing a great magnifying power to bear upon these tiny bud contents, it was discovered that sixty-eight flowers could be counted,

and that even the very pollen on their stamens could be seen.

With the gentle warmth of spring the bud cement begins to melt and yield. There is an unwrapping of the scales. The dark outer coverings fall back. The rising sap pressing from below exerts its influence to swell the enfolded life. Then the inner coats of purest down appear and are in turn thrown off, and rapidly the imprisoned leaves and flowers come forth to light and air—the leaves with tint of golden green, the flowers with hues of white, and pink, and gold. The great leaves at first hang flacidly upon the twigs, as if drooping for want of moisture. But they soon expand, stiffen, and spread out their large surfaces from the summit of their long green and stout stalks. The leaf of the Horse-Chestnut is singularly characteristic, and does not even remotely resemble the leaf of any of our other woodland Trees. The leaf-stalk varies in length with the size and development of the leaf. From its apex spring six or seven—generally seven—pear-shaped lobes, arranged in a circle—with appreciable spaces between each lobe—around the apex of the stalk.

The outer lobes are always the largest, and each is furnished with a very prominent mid-vein, forming a thick green ridge on its under side and a green groove on its upper side. The mid-vein of each lobe is indeed so prominent that it appears more conspicuously than the mid-veins of leaves in general—to divide the lobe into two halves. From the mid-vein the veinlets proceed on each side diagonally and in nearly parallel lines—being occasionally forked near their ends, to the serrated lobe margin. The veins of a large Horse-Chestnut leaf presents, especially when looked at on the underside, a singularly prominent and systematic arrangement; the colour of the leaf when fully developed loses its golden hue, and turns to a deep dark green, not unfrequently attaining a length—stalk and leaf together—of more than two feet. It is the size of its individual leaves which give to the Horse-Chestnut its singular massiveness of foliage, and their dark colour—acquired when the Tree is in full flower—helps to throw out in strong relief the beauty of the delicate blossoms. Those who at Bushy Park, or elsewhere, have seen, during May, Horse-Chestnuts in the full glory of leaf and

blossom will have learnt to appreciate the singular beauty of this handsome Tree. Its clusters of blossom produce a small proportion of fruit—small, that is to say, compared with the number of individual flowers. By the autumn, the fruit, enveloped in its green, prickly, three-celled case, has reached the form of roundish, polished, redish-coloured nuts, which are known from those of the Sweet Chestnut by being less pointed.

The soil which best suits the Horse-Chestnut is rich loam, in which it will grow rapidly; and a curious fact in connexion with this Tree is that its entire summer growth—in so far as length is concerned—is usually effected within a month from its commencement. Afterwards there is thickening and consolidation of its new substance, and then the period of annual decline commences: and though, in its decline, it does not add to the charm of autumnal colouring, we may well remember the singular beauty of its 'first fair blossoming.'

## 12.

### THE WALNUT.

*Juglans regia.*

PLATE 2, FIG. 3.

ROUGHNESS of trunk, expansiveness of foliage, sweetness of fruit, and beauty of timber, are amongst the characteristic qualities of the Walnut Tree. Delighting in good, rich, somewhat chalky, and dry soil, it is now found extensively growing throughout this country; and though not, in all probability, a native of Britain, it has been with us since the time of the Roman invasion, and was possibly introduced amongst us by the Romans. It is believed to have been, in the first

instance, brought here from France, and its common name is supposed to be a corruption of 'Gaul nut.' Though the Romans considered that the shade of the Tree was injurious both to mankind and to any vegetable undergrowth, it was very highly esteemed amongst them for its fruit, both for food and for medicine, and the name which they gave to it of *Juglans*, meant Jupiter's nut.

The leaves of the Walnut are large, oval, dull dark-green, with a reddish tinge, and rounded at both ends, with a short stalk. The venation is very prominent, consisting of a mid-rib with alternate veinlets, given off towards the unindented margin; but curled upwards as they near the margin instead of proceeding straight to the edge. There is a very fragrant perfume—a strong lemon-scented odour—in the leaves. The flowers consist of two kinds—barren and fertile—borne on pendant catkins. It is a curious fact, that the buds or spurs which ultimately develope into the barren flowers protrude in the summer preceding their expansion from the axils of the leaves; but this is not the case with the

fertile or pistil-bearing flowers, which appear and develope into fruit in one season, after fructification by the stamens of the barren flowers. The fruit or nut is enclosed in a green one-celled case; and is, whilst green, and before having ripened into the sweet brown shell-covered nut, made, as is well known, into a favourite pickle. The Walnut liquor, produced from the green nuts, has also been used as a medicine for strengthening the stomach. From the Walnut, too, is extracted an oil that is used for burning in lamps, for various culinary purposes, and—by artists—for mixing with colours; its value for this last-named purpose arising chiefly from its readiness to dry. The well-known Walnut dye is made both from the leaves of the Tree and from the husk of its fruit. The extensive use of the timber of this Tree for furniture has rendered it familiar to every one. Its beautiful colour and markings, and the ease with which it can be manufactured into the large number of articles for which it is suited, give it a great value. The sere autumnal leaf of this useful Tree is not devoid of beauty, and

when the leaves have gone, there is beauty still in the form of stem and bough, and of twig, with its promise, in clustering buds, of future blossoming.

## PLATE III.

1. Sycamore.
2. Western Plane.
3. Oriental Plane.
4. Maple.
5. Arbutus.
6. Privet.
7. Mountain Ash.
8. Spindle Tree.

Mountain Ash

## 13.

### THE SYCAMORE.

*Acer pseudo-platanus.*

PLATE 3, FIG. 1.

JUDGING by the readiness with which the Sycamore, or 'False Plane,' as it is sometimes called, owing to the similarity of the form of its leaf to that of the Plane-Tree, grows in this country, and by its abundance, it might be popularly supposed that it is a native of Britain. Such, however, is not the case, though it has been with us for probably about three hundred years. The common name of the Tree has led some persons to suppose that it is identical with the Sycomore-Tree mentioned in Scripture,

and indeed the name Sycamore, still retained, was originally given to it under the same belief. The Tree, however, of the Bible was the Mulberry Fig of Palestine (*Ficus sycomorus*), a Tree wholly different—except in the general shape of its leaves—from *Acer pseudo-platanus*.

Notwithstanding what has been said in disparagement of our English Sycamore, the Tree possesses many valuable and beautiful qualities. It grows very rapidly, perfecting its seeds in twenty years from the time of commencing its growth. When full-grown—at fifty or sixty years of age, it reaches a height of sometimes eighty feet, though this height is rather exceptional than common. Its term of life seldom reaches beyond a century and a half, or two centuries, though it has been known to live much longer than two hundred years. The soil to promote its most rapid growth must be rich—not too moist—and porous, or what is called 'free,' that is to say, unclogged by too great an intermixture of clay, though it is so hardy and bold a grower, that it will thrive in almost any soil; and it will often be seen growing in all kinds of unexpected places

to which the seeds from neighbouring Trees have been wafted.

The leaf of the Sycamore is, when in its freshest and most perfect form, very beautiful. Its matured stalk, sometimes developed to a great length, is reddish in colour, and this colour is often continued along the principal veins which run into the leaf. The colour of the leaf is deep green on its upper side whilst the under side is much lighter, having oftentimes a whitish, downy appearance. Its shape is what botanists call *cordate* which means similar to the 'heart' in cards, from the Latin *cordatus*. It has been more popularly described as 'fan-lobed,' because the lobes—of which there are five, the three upper ones being large and the two lower and opposite ones being much smaller—are somewhat fan-shaped. Each lobe is deeply but irregularly indented, the indentations dividing the leaf into lobes being very deep and acute. Through each lobe runs a principal vein, in an almost straight line. Starting from the apex of the leaf-stalk, these principal veins give origin, on each of their sides, to branch veins, which, making rather obtuse angles with the principal

veins, run obliquely and somewhat wavily to the leaf-margin, reticulating—as is the case with the venation in all our woodland Trees—in the leaf-spaces between the principal lines of the venation. The greenish yellow flowers of the Sycamore are produced before the leaves have reached their normal size; they contain a good deal of honey, and hence are much sought after by bees. The racemes of blossom—a raceme is a spike of flowers supported each on a short stem—hang droopingly from the twig, and, after fructification, the fruit produced is enclosed in a little cell provided with double wings, and called a double *samara*. Its colour, when ripe, is reddish brown, and it bears a striking resemblance to wings. Wings, indeed, they are in very truth, and their purpose is to enable the ripened seed to be wafted away during the high autumnal winds to some fit resting-place. It is this winged character of the Sycamore seed that accounts for the number of seedling Trees which are found growing in so many and such unexpected places.

The Sycamore leaf has its season of beauty and its season of unloveliness—and this is the case,

unhappily, in a greater or less degree, with many beautiful things. Dark blotches appear towards the end of summer on its surface; and insects, too, make their raids upon it, attracted no doubt by the 'honey dew,' as it is popularly called, which gathers on its upper side. The leaf-edges also shrivel and turn brown, and then the beauty of the foliage is gone.

But though the leaf is not insect-proof, the timber is freed from their ravages, and is useful for many purposes. It has a beautiful grain, is of a white colour when young, but gets yellower as its age advances. It is used by the cabinet-maker, the joiner, and the turner. It will take a high polish, and it does not warp; and is often manufactured into cider presses, gun-stocks, and musical instruments.

Apart, however, from these uses, the density of the Sycamore's foliage and the fineness of its individual leaves tend to make it, when in the pride of its glory, a beautiful Tree.

## 14.

### THE WESTERN PLANE.

*Platanus occidentalis.*

PLATE 3, FIG. 2.

BEAUTY and luxuriance of leaf and adaptability for town culture are the distinguishing characteristics of the Western Plane, a Tree which, though it first came to us from America, so late as the year 1636, has adapted itself so thoroughly to the conditions of our climate—showing almost a preference for the smoky atmosphere of our crowded cities—that it has become one of the most familiar of our Trees. It grows with great rapidity, and with a vigorous uprightness—grows indeed so rapidly, that, under

favourable conditions, especially when planted near water, it will rise to the height of forty feet in the extraordinarily short period of ten years. Indeed, it is recorded by Mr. Loudon, that a specimen of *Platanus occidentalis* planted in the garden of Lambeth Palace had, in twenty years, from 1797 to 1817, grown to the great height of eighty feet, having a trunk eight feet in circumference at three feet from the ground—the diameter of its head of foliage being no less than forty-eight feet. In twenty years more, namely, by the year 1837, this remarkable Tree had reached a height of a hundred feet. It is its power of rapid growth, its utility as a town Tree, and the facility with which it can be propagated, either by cuttings, layers, or seeds, that have led to the extensive cultivation of the Western or American Plane, called also in the country of its origin Button Wood, Water Beech, Sycamore, and Cotton Tree. In American forests this beautiful Tree reaches an enormous size, its trunk not unfrequently measuring forty feet in circumference at five feet from the ground. One instance, indeed, has been given of a Plane which, on the

banks of the Ohio, measured round its trunk forty-seven feet, carrying this enormous circumference to a height of twenty feet from the ground, and then commencing to branch. Those who have seen the Western Plane growing in England, have doubtless often noticed the great length of its unbranched stem. In America it is by no means uncommon for specimens of this Tree to produce an unbranched trunk reaching to a height of as much as eighty feet. To attain a favourable growth, this Tree should have, as we have said, a moist soil, if possible near water, with plenty of depth for rooting, though it is essential that the soil should be 'free.' It will not thrive in exposed places, especially if these are elevated. A sheltered position is the most suitable for it, even though the shelter may be furnished by tall city buildings. The City of London will furnish many examples of prosperous Planes growing in the most dismal parts of the district. A Tree, in the square adjoining Stationers' Hall Court, will afford an illustration of this remark, and there is another and a finer Tree in a garden at the rear of the Stationers' Hall, in a yet more confined position.

The beauty of the leaf of *Platanus occidentalis* consists in its golden green colour, its expansive surface, and its symmetrically cut form. It bears a sort of general resemblance as to form to the Sycamore leaf, is somewhat similarly lobed, and somewhat similarly veined. But its outline is much more angular, its indentations are not so deep, it is lighter, and more graceful in appearance, and instead of being dark-hued it is singularly bright with its rich glow of golden green.

Its very small flowers are borne on globular catkins, and are of a greenish hue. The seeds, like the flowers, are crowded around a central point, forming a ball, are individually somewhat club-shaped, brownish in colour, and furnished at their smaller ends with bristly down, soft and light, and serving the purpose of wings to bear them away when the fit season has arrived. These balls of seed form a conspicuous feature of the Plane during the winter, for they remain on the twigs long after the foliage has disappeared, and indeed until the ensuing spring.

An interesting and noticeable peculiarity of the Western Plane is the periodical pealing off, in

long strips, of its bark, an operation which has the great advantage of relieving the Tree of the pressure of fungi, mosses, and any other deleterious matters which may have collected on its trunk. The colour of the bark is a greyish white, and it retains this normal hue by the continual process of renewal. Another peculiarity consists in the curious and beautiful arrangement under which the new leaf-buds are produced. Instead of appearing, as is usually the case in our Trees, in the angles formed by the leaves and the stems on which the leaves are borne, they are enclosed in hollow cases provided at the feet of the leaf-stalks. It is, in fact, the bases of the leaf-stalks which furnish these cases: thus serving the double and beautiful purpose of supporting their own green expansions of cellular tissue, and of covering from injury, from sudden heat, or sudden cold, from smoke and dust, and dry, hot air, the tender buds of the succeeding year. Yet, though the Plane is a deciduous Tree, and the time must come when the protecting hollow of the leaf-stalk must fall with the fall of the leaf, it will be found that Nature has not been unmindful; for during

the joyous season of summer she has been making and perfecting a beautiful and elaborate system of envelopes in anticipation of the autumnal fall, and of the wintry cold. Upon the tender bud she has placed a garment of silky softness. Upon this she has laid some fur-lined scales, and she has enwrapped the whole in wet-proof, resinous cases. When the young leaf at length appears, it is found to be covered on its under side with the silky down with which the bud was clothed erewhile: another proof of the loving care of Nature in guarding from the chance colds of abnormal spring-time the tender tissues of the golden leaf. Perfect, and beautiful indeed, are the works of the Almighty Creator of the natural world!

Though the wood of the Plane is beautifully grained, will admit of being highly polished, and is used, abroad, for the purposes of the cabinet-maker, the carpenter, and the joiner, it is not highly esteemed for its quality. But there is value, beyond price, in the delightful spread of its beautiful and health-giving foliage, and in the sociability which leads it to display its

wealth of green and gold in the darkest and dreariest corners of the most dismal town centres, bringing gladness to tired eyes, freshness to wearied brains, and sweet thoughts of 'the country' to poor people who never see green fields, and whose hard lives would be sad indeed but for the glory and beauty of town Trees.

For those who would wish to extend the heartiest welcome to the Western Plane, to plant it in their gardens or parks, and to do what in them lies to promote its wholesale introduction into town streets, into treeless corners, or into any place suited for this beautiful Tree, we have already given the very simple conditions of culture, namely, a moist, free, rich soil, with as much protection from exposure as possible. The Tree may be grown either from seed, by layers, or by cuttings. The abundance of its seed will probably suggest a preference for this form of propagation. The seed should not be gathered until late in the autumn, or it may even be left until early in the following spring, and in either case can be planted as soon as gathered in rich, sandy soil, and lightly covered with mould. If planted

in the autumn it will germinate, and grow up in the spring; and its growth, if in a very moist—but not soddened—and sheltered position, will be very rapid.

## 15.

### THE ORIENTAL PLANE.

*Platanus orientalis.*

PLATE 3, FIG. 3.

THAT we have said of the Western Plane will apply in a great measure to the present species; and here it will therefore be chiefly necessary to note the distinguishing features of the two Trees, remarking first that *Platanus occidentalis*, though considered somewhat less ornamental than the Oriental Plane, grows more readily and rapidly and requires a moister soil or proximity to water, though in many a city corner it flourishes well without either a very moist soil or the presence of water. *Platanus orientalis* does not shed

its bark so freely as the Western Plane, a fact which is doubtless explainable by the difference in the rate of growth—for it is the rapid growth of the trunk in *Occidentalis* and the comparative inelasticity of the bark tissue which occasion the rupture of the latter. The fruit catkins are not so large, but are rougher externally than those of the Western Plane. It frequently grows to a height of more than seventy feet, has a wide spread of branches—which sometimes 'feather,' to use a popular expression, to the ground—a thick trunk and altogether a noble and very beautiful appearance.

But it is in its leaves that the most ready distinction between the two species of Plane is furnished, the indentations in those of *Orientalis* being much more deeply cut than in those of its western relative, and having less of the light golden hue, which is so characteristic of *Occidentalis*. The upper lobe, through the centre of which runs the principal vein, continuing in an almost straight line from the leaf-stalk, is especially prominent, from the circumstance that the indentations which separate it from the two lobes on each side of it

are extremely deep, and although the indentations dividing the other of the five principal lobes into which the leaf is divided are also deeper than in the leaf of *Occidentalis*, it is the upper lobe which, as we have intimated, furnishes the prominent and distinguishing feature of *Orientalis*.

Owing, in all probability, to the greater ease with which it can be propagated, and to the greater rapidity of its growth, the Western Plane is much more abundant, especially within town limits, than *Platanus orientalis*, although the latter has been an inhabitant of this country for a century longer than the other species, having been introduced into England prior to the year 1548.

But both these Trees are very beautiful. The twisting of the upper branches appears arranged as if to provide for the greatest degree of umbrageousness; for, as all leaves, twigs, and branches naturally make for the light, the twisting tendency of the Plane branches enables them to fill up any spaces which might admit too much sunlight. Yet they pliantly give way to the pressure of the

wind, opening up from time to time interstices in their beautiful heads to admit through the wealth of greenery above, sweet gleams of sunlight to gild the moving forms of the leaves below.

## 16.

### THE MAPLE.

*Acer campestre.*

PLATE 3, FIG. 4.

LESS known—at least by townspeople—than its much larger and more robust relative the Sycamore, the Common or Field Maple is, nevertheless, what the Sycamore is not, a native of Britain. It very frequently does not attain even the size of a Tree, being more commonly seen, where it often grows as an abundant shrub, in hedgerows, in the country. Though—even as a Tree—its height does not often exceed twenty or thirty feet, it sometimes exceeds forty feet. It is easily recognized by its

leaves, which though, roughly speaking, are similar to those of the Sycamore—being, like them, five-lobed—are, nevertheless, very characteristic and distinct. The Maple, in the first place, has a much smaller leaf than the Sycamore, and its leaf has also a more decidedly red hue, with a more distinctly red leaf-stalk, and a greater corresponding redness of the principal veins running through the leaf than is the case in the leaf of *Acer pseudo-platanus*. Its surface, too, is more glossy, both on its upper and under side, than the Sycamore leaf. In the deep indentations dividing the lobes of its leaves, *Acer campestre* somewhat resembles the Oriental Plane; but there is a conspicuous rotundity in the apices of the lobe divisions. The venation very closely resembles that of the Sycamore leaf, a principal vein running into each of the five lobes, and branching on each side to the leaf margin. It will be noticed that the Maple leaf is often studded with small red excrescences. These are tenanted by insects, by whose action they have been produced, after the manner of the Oak 'spangles.' The yellowish green flowers of this Tree are borne on racemes, the

spikes of which are distinguished by being very erect: and a noticeable feature in the Maple is that the wings of its double samaras, or winged seed-vessels, are much less bent than is the case in the Sycamore, thus giving a resemblance to spread pinions.

From the juices of the Maple, sugar may be extracted. The juices, indeed, in all the species of the genus *Acer* are more or less saccharine, although inappreciably so in the Sycamore. The leaves, too, with the tender shoots, make a wholesome food for cattle. It is, however, in its timber that the Maple possesses the greatest utility—Maple wood, on account of its fine grain, beautiful markings, and adaptability for taking a high polish, being greatly valued, and largely used in the manufacture of tasteful articles. The Romans used it largely for the making of tables. Even the roots of the Tree are sometimes so beautifully knotted that they are used for the choicest work of the cabinet-maker.

In cultivating this Tree a dry soil and an open and airy position are desirable. A peculiarity about the seed is, that it frequently will not

germinate during the first spring after it has been planted, but remains quiescent until the succeeding season.

Its autumnal leaf is beautiful, for the glossy green, with shades of red of early spring and summer, are turned to tints of yellow, ere the branches are left to their wintry sleep.

## 17.

### THE ARBUTUS.

*Arbutus unedo.*

PLATE 3, FIG. 5.

KILLARNEY alone in Britain furnishes the wild Arbutus or Strawberry-Tree, although the species is abundantly cultivated in park and garden, owing doubtless to the ease with which it grows when propagated, either by seed, cutting, or layer, in soil consisting of sandy loam or an intermixture of that soil with peat. It is a small Tree, seldom exceeding twenty feet in height, though sometimes reaching thirty; and whilst it can be known by the rich colour of its dark, glossy, evergreen leaves, its

most conspicuous winter mark of recognition is its globular scarlet fruit, with a granular surface, somewhat resembling the strawberry—the granules, however, instead of protruding, like those in the strawberry, being buried under the cuticle of the fruit. But, unlike the luscious strawberry, the Arbutus berries wear their scarlet hues late in the year, and hence the name of 'winter strawberries,' sometimes applied to them. The flowers are white, deep, and vase-shaped, and hang in racemes from the twigs. The succeeding fruit attains the size of cherries. To the taste it is insipid, and rarely eaten, although it is believed that its flavour, like that of fruit in general, very much depends upon the soil in which it is found, and upon other conditions of growth. In its wild state, in the neighbourhood of Killarney, where it grows abundantly on the hills and rocks, the fruit is eaten by the country people, who doubtless find it more pleasant than the berry of the cultivated plant.

Of the uses of the Strawberry-Tree—except those which consist in being beautiful—it is impossible to make a long list. The wood is dark

in hue, and ornamented by darker lines, and is made in the neighbourhood of Killarney into fancy boxes, which are sold to visitors to that beautiful district. But it is otherwise of little value. The flowers of the Strawberry-Tree abound in honey, and thus give food to thousands of insects. The leaves, too, are sometimes employed for tanning purposes, and from the berries can be extracted spirit and sugar.

Under its bright gloss the dark green leaf of the Arbutus is very beautiful. It is ovate in form, smooth on both surfaces, but much lighter in colour underneath than on its upper side. Its edge is *serrulated*, or finely notched. Though somewhat opaque in substance, its venation can, nevertheless, be distinctly traced. It consists of a very rigid and prominent mid-vein, running in continuation of the leaf-stalk to the apex of the leaf; and from this, on each side, are given off towards the leaf margin a number of wavy, and forked veinlets.

Like most evergreens, the Arbutus is an enduring Tree. It is easily propagated by seeds, and will grow well and readily if planted in light, rich,

sandy soil, in almost any position, except under the shelter of other Trees. It thrives best in deep soil, will flower at the early age of five or six years, and will attain a height of ten feet—nearly half its average maximum height—in ten years.

The autumnal beauty of *Arbutus unedo* is shown not in the dying splendour of decaying foliage, but in the deepest, freshest hues of glossy green, and in the brightening tints of the incipient fruit.

## 18.

### THE PRIVET.

*Ligustrum vulgare.*

PLATE 3, FIG. 6.

YIELDING very little as a contribution to the industrial arts, and, indeed, having small pretensions even to rank as a Tree at all, the well-known Privet is both beautiful and useful. Discussing first the more strictly practical uses to which it can be put, we shall merely have briefly to say that its berries are capable of furnishing both a green and a pink dye; that oil for burning, for culinary purposes, and serving as a contribution to the manufacture of soap, may be also obtained from the Privet fruit; that its

young twigs find employment in the art of tanning, and are also used on account of their toughness and elasticity for making baskets and for tying articles together. Indeed, it is this last-named use of the Privet by the Romans that suggested its generic name of *Ligustrum*, a derivation of *ligo*, to bind or tie.

But we repeat that the Privet, in another sense, is both useful and beautiful—namely, in its leafiness and freshness, qualities which are especially beautiful in this plant, because of their persistence under adverse circumstances. Who will say that there is not a charm in its densely clustering foliage,—green always, in spite of drip and shade —in its white and sweet-scented blossom, and in the purple sheen of its winter fruit? It is amongst the most sociable of our woodland Trees—for Tree it is, though of small stature, and rarely seen above the height of a shrub. It will thrive almost anywhere, and serve almost any purpose where greenery is desired. It will even please by retaining or throwing off its foliage, according to the position in which it is placed; retaining it and being an evergreen when sheltered

and becoming deciduous when exposed. It does not mind the smoke of towns, and will thus help to make green the most dismal corners: whilst, if it be provided with good and moist and very loamy soil, it will thrive to perfection; and though it becomes deciduous in open places, it will make amends for its loss of winter foliage by thicker clustering and taller growth in the succeeding spring and summer. It can be raised from seed; but a speedier method of propagating it will be to plant its cuttings.

As we commonly see it in town gardens, cut into unnatural shapes, the Privet is but a bushy shrub; allowed free play it will become a Tree, and though small in stature—not often exceeding ten feet in height—a thing of beauty. Its leaves are arranged on their stems in opposite pairs, are smooth on their surfaces, rather dull than glossy, with entire or even edges, small and lance-shaped, having conspicuous mid-veins proceeding in almost straight lines from their very short stalks to their pointed apices—the branch veins not being very conspicuous. Its funnel-shaped four-petalled flowers are borne on compound racemes—main

spikes branched, and bearing on each branch a cluster of stalked blossoms. The flowers soon change from white to reddish brown, then give place to tiny, green, globular berries, which anon enlarge into ripe, purple fruit.

## 19.

### THE MOUNTAIN ASH.

*Pyrus aucupæria.*

PLATE 3, FIG. 7.

SIMILARITY of leaf to the Common Ash has alone suggested the popular name of *Pyrus aucuparia*. It bears, however, no relationship to its namesake; and though the leaf, in the system of arrangement of its leaflets in opposite pairs on the rachis—or stem continuing the leaf-stalk—and in its single leaflet at the termination of the rachis, bears a strong likeness to *Fraxinus excelsior*, the difference between the leaves of the two is discernible in the beautifully serrated edges of the leaflets of *Pyrus*

*aucuparia*, and in the smaller size of the leaves. Their colour, too, is a deeper green, and the leaflets are not so pointed at their apices as is the case in those of *Fraxinus excelsior*, though there is a very similar arrangement of veins.

The Mountain Ash is not a large Tree, rarely attaining a height of more than thirty feet, whilst oftentimes it is much smaller. It is a rapid grower, and will often reach a height of twenty feet in ten years. It will live to the age of a century, but it seldom will make any very appreciable increase in height after the first twenty-five years of its existence, so that in the race for life amongst the vegetable inhabitants of the forest the Mountain Ash often succumbs to the influence of more vigorous species; for it suffers from the shade and drip of taller Trees, which, perhaps, it may have sheltered in their younger days. When, however, it is not thus overcrowded and stifled it is a singularly hardy Tree, for it can withstand any amount of exposure, will grow at elevations of more than two thousand feet above the sea level, and will thrive in almost any soil. Indeed,

it delights to grow in exposed mountainous districts; and hence its name.

Its flowers are white and five-petalled, are borne on cymes, are very abundant, and produce berries, which, though first green in colour, are, when the autumnal ripening is perfected, of a brilliant coral red. They are greedily eaten by birds, and sometimes, in Scotland, where the Tree abounds in its largest size, are made into an edible jelly. In Wales, a kind of perry—the Mountain Ash, be it remembered, is closely allied to the Pear Tree—is manufactured from the berries, whilst their use for the manufacture of 'bird-lime' has given to *Pyrus aucuparia* the name of the 'Birdcatcher's Service Tree.'

Its small size prevents this graceful and beautiful Tree from making much timber. But its wood is valuable nevertheless for its fine grain, and for its adaptability for manufacture into tasteful articles for which the qualities of hardness and susceptibility of polish are desirable.

For an ornamental Tree *Pyrus aucuparia* has great qualifications. It can be easily raised from seed,—though the seed will not appear above

ground until it has been planted a year and a half—and as it will thrive under town cultivation, it should be largely propagated for the beauty and grace of its foliage and for the crimsoned richness of its autumnal fruit.

## 20.

### THE SPINDLE TREE.

*Euonymus europæus.*

PLATE 3, FIG. 8.

GREENNESS of foliage and brilliancy of fruit are the prominent characterestics of the Spindle Tree, a name acquired by this species on account of the use of its wood for the manufacture of spindles. It ordinarily attains only the dimensions of a shrub, but as it not unfrequently reaches a height of as much as thirty feet, it may fairly lay claim to rank amongst the lowliest of our woodland Trees.

Its wood is hard and of a fine grain, and hence, as we have said, its adaptability to the purpose

which has originated its common name. Its smooth branches and its leaves are remarkable for their greenness, the leaves being of a golden hue. They are borne on short stems and, like the twigs on the boughs, usually grow in opposite pairs. In shape they are somewhat lance-shaped, their tips being drawn out to a point. The venation consists of a prominent mid-vein, with alternately branching, very wavy, and occasionally forked veinlets, proceeding in an irregularly diagonal course to near the leaf-margin, which is slightly toothed or serrated.

The greenish white flowers of the Spindle-Tree are small, four-petalled, and borne upon cymes. The scarlet seed, which grows in great abundance, is contained in four-celled cases, and adds great beauty to the plant. But the leaves and stems are acid to the taste, and poisonous.

A peculiarity of the roots of the Spindle-Tree is, that they form a dense network of fibrous rootlets, which, however, usually keep in a compact mass, and do not spread very far from the plant.

Like many others amongst the most beautiful

of our woodland Trees, *Euonymus europæus* is little cared for or cultivated in our gardens; though the freedom with which it grows and the ease with which it can be raised from seed should tempt the dwellers in our towns to nurture it, if only for the beauty of its autumnal dress, shown in its red-hued leaves and in the brilliant colour of its abundant fruit.

## PLATE IV.

1. Guelder Rose.
2. Wayfaring Tree.
3. Black-fruited Cherry.
4. Red-fruited Cherry
5. Pear.
6. Bird Cherry.
7. Wild Service Tree.
8. Apple.
9. White Beam.
10. Honeysuckle.
11. Hazel.
12. Barberry.
13. Hornbeam.

## 21.

### THE GUELDER ROSE.

*Viburnum opulus.*

PLATE 4, FIG. 1.

QUALIFIED rather by its size as a garden plant, than as an inhabitant of British woodlands, to rank as a Tree, the Guelder Rose can, nevertheless, claim to take rank, even in the forest, amongst at least the lowliest order of Trees. It attains in the woods a maximum height of about twelve feet, and is remarkable for the vivid greenness of its leaves in summer, and for the rich beauty of colour displayed by its autumnal fruit. Its flowers of a pure white,

clustered into pedunculated or prominently stalked cymes, which form a large, conspicuous head of bloom, finely contrast with the bright green of the foliage. The Guelder Rose leaf is very succulent-looking, and somewhat palmate or hand-shaped, and decidedly three-lobed, each lobe being irregularly indented with rather broad indentations, the upper lobe being much larger than the two lower ones. The venation is very distinct, consisting of three principal veins proceeding from the apex of the short leaf-stalk to the apices of the three lobes with somewhat irregular branches proceeding from them in a diagonal direction towards the leaf-margin. The berries which succeed the summer blossoming are of a bright red colour, but though juicy, they are bitter and uneatable.

Of easy culture in almost any soil after propagation by layer or seed, this Tree invites attention, not only by its summer dress of green and white, but by the singular beauty of its autumnal hues. The leaves then assume a deep crimson colour with hues of purple, as if they strove to rival the tinting of the fruit. And when the crimson

leaves have gone, smitten by the frosts of approaching winter, the twigs on which they hung are still crimsoned by the bright-hued berries.

## 22.

### THE WAYFARING TREE.

*Viburnum lantana.*

PLATE 4, FIG. 2.

HIGHER than its relative—the Guelder Rose—reaching in our woodlands a height of fifteen feet in the small space of five or six years, *Viburnum lantana* has not, perhaps, quite the same claim to be regarded for its beauty of blossom, which is borne in a crowded head upon a stalked cyme. The leaves are thick, soft, and somewhat velvety to the touch, and on both sides, but very conspicuously on their under sides, are clothed with white mealy down, which gives a

kind of dusty, travel-stained kind of appearance, which may, perhaps, have suggested the common name of 'wayfaring' Tree given to this species. The form of the leaf is somewhat pear-shaped, and it is borne on a short green stem. The venation on the upper side of the leaf is not so distinct and prominent as it is on the mealy under side. The mid-vein passing from the apex of the stalk to the apex of the leaf, gives off from each side in alternation a series of wavy branches, which are beautifully forked towards their extremities. The entire arrangement of veins can be clearly discerned by holding the leaf against the light.

From the berries of the Wayfaring Tree a kind of ink is made in Switzerland, whilst in Germany the young stems of the Tree, by their pliancy, are found to be useful for basket making and other purposes. Rapidly grown and readily propagated, this woodland Tree will furnish a desirable addition to our gardens, if only for the striking beauty of its autumnal foliage, which becomes in colour a deep rich red. Its white summer flowers too, are succeeded by berries,

which alternate in their colours of red, yellow, and black; and by sometimes presenting these varying colours on the same Tree, they add to it a singular element of beauty.

## 23.

### THE BLACK-FRUITED CHERRY.

*Cerasus sylvestris.*

PLATE 4, FIG. 3.

CERASUS, the ancient name of a town in Asia, was, it is understood, the place whence cultivated Cherries were first imported—about the year 68 B.C.—into Europe; and Lucullus, a Roman general, is, it is believed, the individual to whom Europeans are indebted for this now well-known and juicy fruit. From Italy Cherry-Trees were brought into Britain, about half a century before the Christian era, and hence, although these Trees are not, according to such evidence as is obtainable

actually natives of our island, they have been so long naturalized here that they would have peculiar claims upon the regard of English people, even were they not so valuable as they are as an article of food.

Though the present species has given origin to a large number of cultivated varieties since its original introduction, it is not with the garden Cherry that we have to do in this place, but with the bitter-fruited Cherry of the woods. The wild Cherry is not ordinarily a large Tree, although it often attains a height of upwards of fifty feet, and not unfrequently has been known to reach, where the situation and conditions of growth have been very favourable, a height of as much as seventy or eighty feet. Its clusters of five-petalled flowers, which generally appear before the leaves, are white. The leaves are somewhat large, drooping in habit, oval in shape, sharply pointed at their apices, with serrated margins. On their under-sides is scattered, more particularly near the mid-veins, a small quantity of light, hairy down. At or near the apex of the leaf-stalk will be found, on examination, two small reddish-

coloured, fleshy protuberances, or glands. The venation is very regular and conspicuous, consisting of a rigid and prominent mid-vein, with prominent branches, proceeding in somewhat parallel lines to the serrated leaf-margin, near which they are generally forked, the reticulation of smaller veins, as is usual with all the leaves of exogenous Trees, lying between. The *drupe*—a term applied to all fruit whose seed is enclosed in a flesh-covered 'stone'—of *Cerasus sylvestris* is rather small, and black, or black red, bitter to the taste when young, and flavourless when ripe, the fleshy part of the fruit being small in comparison with the size of the stone, which is the same general shape as its juicy covering. It is noticeable that the skin of the flesh cannot be separated or pealed off from it, and the flesh also adheres to the stone. The reddish tinge of the Cherry Tree leaf is imparted to the timber, which is reddish in colour; and is also close-grained and strong. It can be easily polished, and easily cut, and is used for the purposes of cabinet-makers, turners, and musical instrument makers.

It is unnecessary to remark on the ease with

which the Cherry can be cultivated, for its extensive propagation when grafted and transferred into the sweet-fruited garden varieties, proclaim its amenability to culture. It will thrive, indeed, in any soil which is not too wet, although fertilization of the ground is, of course, necessary where a high state of culture prevails.

The wild Black-fruited Cherry adds the charm, not only of fruit, but of leaf, to the autumnal colouring of the woods, for its dying leaves have hues of bright crimson, intermingled with rich tints of yellow, which give them peculiar beauty.

## 24.

### THE RED-FRUITED CHERRY.

*Cerasus vulgaris.*

PLATE 4, FIG. 4.

DECIDEDLY of smaller size than *Cerasus sylvestris*, the Red-fruited Cherry is also know by the character which has given to it its common name, as well as by its smaller leaves and flowers. In other respects both leaves and flowers are similar—with a similar arrangement of veins in the former, and a similarly serrated leaf-margin—the flowers being five-petalled and white. The fruit besides being red, is round in shape, juicy, and acid to the taste. Two distinguishing features in the fruit of the present

species consist in the less adherent quality of its fleshy portion; for whilst in the Cherry of the Black-fruited Tree the skin adheres to the flesh, and cannot be separated, and the flesh also adheres to the stone, in *Cerasus vulgaris* the case is the reverse, for the skin will peel from the flesh, and the flesh can be easily separated from the stone. Although the Red-fruited Cherry Tree is smaller in size than *Cerasus sylvestris*,—seldom exceeding forty feet in height, though sometimes rising higher—it is a more rapid grower, and when grown for its timber, will reach its maximum size in about fifty years. The wood is largely used for many of the purposes to which mahogany is applied, and is little inferior in point of beauty to at least some of the less valuable kinds of mahogany.

In its autumnal colouring there is great beauty in the leaves of *Cerasus vulgaris*, with their tints of red and yellow, brightened by the crimsoned hues of the glossy fruit.

## 25.

### THE PEAR.

*Pyrus communis.*

PLATE 4, FIG. 5.

AMONGST cultivated fruits there are few which are more pleasant to the taste than Pears. But the quality of edibility cannot be claimed for the subject of this chapter, although it has the distinction of having been the original stock from which its garden relatives have descended. The Wild Pear of our woods and hedges is a Tree which is not usually found of a large size, being seldom more than fifty feet in height, and much more frequently less than

that, though it has been known to attain a height of seventy feet. It assumes a pyramidal form of growth, and like the wild plum has thorns on its branches—a curious provision of Nature for the defence of these wild fruit Trees, a provision, however, which, on both Trees, mostly disappears under cultivation. Branches, buds, and leaves are smooth, or unprovided with hairs or down of any kind. The leaves are singularly smooth and shining, of a dark rich green, roundly egg-shaped, and slightly serrated, with slightly pointed apices. The venation consists of a prominent mid-vein, with wavy branches directed from each of its sides to the leaf-margin, the reticulation of smaller veins being very wavy and irregular. The flower petals, borne at the apex of a jug-shaped tube, are pure white, untinged by any colour, the flowers being borne in little clusters. The fruit is in form similar to the cultivated varieties of Pear, but seldom more than a fourth of the size of the edible fruit. Wild Pears, which are green in colour, are unfit to eat. The seeds in the centre of the fruit, and surrounded by its fleshy substance, are enclosed in a five-celled, horny, or

cartilaginous case, and there are usually two seeds in each cell.

*Pyrus communis*, in its wild state, is found ordinarily at low elevations where the soil is dry, and seldom on hills or mountains, and is not often found growing in large groups, but rather singly. Its trunk rarely exceeds a foot and a half in diameter, though the Tree grows sometimes to a great age—its age, however, being ordinarily greater under cultivation than when growing wild, and its fruitfulness increasing with its age. Instances are on record of Pear-Trees which have lived more than four hundred years.

The timber of *Pyrus communis* is close, fine-grained, and heavy, having a slight tinge of red. As it readily takes a stain—more particularly of black—it is used for imitating ebony and other wood. It also makes good charcoal. Pear leaves, too, can be made to produce a yellow dye.

A peculiarity of the roots of the Pear is, that they descend perpendicularly into the earth, so that when under cultivation the Tree can be planted in fields without any danger that its roots will interfere with the plough when the soil

around it is turned up. It is a rapid grower, and under cultivation will increase to a height of as much as twenty feet in ten years.

Its autumnal leaves add rich hues of yellow, sometimes tinged with red, to the colours of woodland, plain, and hedgerow.

## 26.

### THE BIRD CHERRY.

*Cerasus padus.*

PLATE 4, FIG. 6.

THE fondness of birds for the fruit of *Cerasus padus* has probably given origin to its common name. It is a beautiful Tree—though not of large growth—having a maximum height of about forty feet. Its flowers are borne abundantly on long racemes, and are of a pure white, each with five petals. The cherries are smal and black, are bitter to the taste, and are borne in clusters or branches which follow a similar arrangement to that of the blossom. The leaves are egg-shaped, with finely and beautifully

serrated or spined margins. They have purplish footstalks, prominent mid-ribs, in continuation of these footstalks, with principal branches, continued on each side to the leaf-margins, and beautifully forked and reticulated. Though the substance of the leaf is not very transparent, its veining can be easily seen when it is held against the light.

Whilst birds are fond of the fruit of *Cerasus padus*, moths and caterpillars have a singular predilection for its leaves; so much so, indeed, that it is considered a wise arrangement, protective of other and more valuable fruit Trees, to plant some specimens of the Bird Cherry, at intervals, amongst ordinary fruit Trees; for it is found that in such cases the insects and moths nearly all repair to the leaves of this species.

The wood of *Cerasus padus* is bitter and disagreeable to the taste like its fruit. It is yellowish in colour and hard in texture, and is valued for various purposes of the cabinet-maker and turner.

A rapid grower on a dry, good soil in a sheltered position, making, for the first five or six

years, an increase in height of two feet each year, it is admirably suited for ornamentation, for its bright green summer foliage is followed by autumnal beauty of red and yellow tints on the normal green hue, contrasting with the sheen of its ebon fruit.

## 27.

### THE WILD SERVICE TREE.

*Pyrus torminalis.*

PLATE 4, FIG. 7.

BEAUTY of leaf is one of the distinguishing characteristics of this Tree. Though somewhat rare in our woodlands, it attains a height sometimes of fifty feet, and bears fruit which is eatable, and not unpleasant to the taste, and which forms both in some parts of this country and in France a marketable commodity. Its leaves are supported on somewhat long footstalks, and may be described to be irregularly four-sided —in such a way indeed that each half, as divided from the other by the mid-vein, forms a sort of

triangle. The margins of the two upper sides are cut into deep lobes, which stand out with great individuality like peaks rising one above another. Each lobe, as well as the leafy apex, is acutely pointed and toothed or serrated. Held against the light, or examined on its under side, the leaf is shown to be beautifully veined. From the straight mid-vein prominent branches run to the apex of each lobe, giving rise, in the intervening spaces, to a delicate system of reticulation. In young leaves their under sides are slightly covered with white down. But when fully developed the down disappears, and the bright green leafy surface is quite smooth and shining. The flowers of this Tree are white, and are produced in clusters at the ends of the twigs. The resulting fruit is in form like the berry of the Hawthorn but somewhat larger. Instead, however, of being the colour of the Hawthorn, the fruit of the Wild Service Tree is brownish.

*Pyrus torminalis* is a Tree of somewhat slow growth; but in a soil which suits it—calcareous and not too moist—it can be readily cultivated and propagated by seed or otherwise. Its wood

is fine-grained, hard, and susceptible of polish, and is put to many uses of the cabinet-maker—making, amongst other things, excellent charcoal.

Its brown autumnal fruit—which, when in a state of half decay, has a flavour not unlike that of the Medlar—adds to the beauty of its decaying leaves of yellow-tinted brown.

## 28.

### THE APPLE.

*Pyrus malus.*

PLATE 4, FIG. 8.

SPREAD of branches rather than height is the peculiar feature of the Apple-Tree—a feature which has become familiar to us in its cultivated form. But it is of the Apple-Tree of our woodlands—the 'Crab' or Wild Apple—that we have here to speak, a Tree which, from the fact that it is unquestionably indigenous to Britain, would be an object of interest, were it not that it has given origin to the producers of the most abundant and—for general purposes—the most valuable fruit that we possess.

To touch upon the subject of cultivated fruit Trees—however much it may be suggested by the mention of the wild stocks from which, by grafting, the cultivated varieties have been, and still can be, produced—would be altogether beside the purpose of this volume. To do any justice to such a subject would require the space which could alone be afforded by a library of books; and the reader, unless he proposes to turn his knowledge to practical account, would probably care little for the information.

Of the Wild Apple Tree, then, we purpose alone to speak in this place. We have said, that in habit it is spreading, and that it does not reach a great height—its maximum height seldom exceeding thirty-five feet—less, therefore, than that of the Pear, and often less than the diameter of its own head. Nor is it so handsome a Tree as the Wild Pear. Its trunk, too, is crooked and contorted, and though when young its branches take a horizontal sweep, they become pendulous as age creeps on. Its trunk is, further, sometimes rendered less handsome by its liability to various diseases.

The Apple leaf is very simple in form—egg-shaped, pointed at the apex, and serrated at its margin. From the mid-vein—continuing the leaf-stalk to the leaf-apex—are given off somewhat irregularly, from each side, branch veins, which proceed in a wavy course, with irregular forkings, to the margin. In the spaces between these veins there is a beautiful system of reticulated veinlets covering the leafy surface. The under sides are paler than the upper, and are somewhat downy or woolly. The fragrant Apple blossom is white with a tinge of pink, the individual flowers having five petals each, and being borne in clusters on the twigs. Of the Apple fruit, it will be noticed, that it is distinguished from that of the Pear by the circumstance that there is at the base of the fruit, where the stem is attached, a hollow or concavity, whilst in the Pear the base of the fruit is convex at the point of attachment of the stem.

In the competition for utility the Wild Apple Tree holds a good place. Its wood being fine-grained and hard, is useful for many purposes. From its bark a yellow dye can be manufactured. Both leaves and fruit furnish food to various

animals—wild boars, cows, goats, horses, and sheep. 'Verjuice' is the juice of the Crab Apple, and is reputed to have the medicinal property of curing scalds and sprains; whilst the term 'pomatum' is believed to have been originated from the circumstance that the article which bears that name used to be manufactured from Apple pulp—the pulp of the *pome*, or fruit—mixed with lard and rose-water.

Those who are sadly deficient in the sense of the picturesque have denied that the Apple-Tree has any claim to the possession of beauty. But such must be strangely unconscious of the fresh verdancy of its glossy leaves, the fragrant wealth of its blushing flowers, and the mellow charm of its ruby and golden fruit. And if it can—and it surely may—borrow an added charm from the beautiful vegetation which clings to it for shelter and protection, who can gainsay the picturesque attractions of the white-fruited mistletoe and of the white and gold of encrusting lichens?

## 29.

### THE WHITE BEAM.

*Pyrus aria.*

PLATE 4, FIG. 9.

ITS mealy whiteness has given the name of White Beam, or, in other words, White Tree—*beam* being the Saxon for Tree—to *Pyrus aria:* for its young stems, its leaf-stalks, and its leafy under sides, over their entire surface, are densely covered by white down. It is a small Tree, often not exceeding a height of much more than twenty feet; but it grows erect, and forms a compact head of foliage. Its roots, too, descend to a considerable distance

into the earth, and ramify also to a considerable distance laterally from the Tree trunk. The leaf is extremely beautiful, somewhat pyramidal in form, divided along the margin into deep, rounded lobes, each of which is serrated. The dividing mid-vein continuing the leaf-stalk, gives out on each side symmetrical branch veins, which run to the apices of the lobes, and are, in turn, branched on each side. The roundish, pale red fruit which succeeds the blossom, is acid to the taste; but becomes mellowed by decay, and, like the fruit of the Wild Service Tree, has somewhat the flavour of the Medlar.

Whilst the fruit of the White Bean is greedily eaten by birds, squirrels, and many other inhabitants of the woodlands, its timber is of peculiar use, on account of its great hardness, close grain, and susceptibility to polish. It was, when wooden cogs for wheels were in request, used for that purpose. The Tree cannot be easily cultivated by cuttings but may be raised from seed, and the young Tree will grow at the rate of nearly two feet a year. The soil best suited to it is one that is chalky and somewhat dry.

Perhaps the greatest beauty of its summer foliage is seen when the breeze stirs the golden green forms of the leaves, showing the silvery white of their under surfaces.

## 30.

### THE HONEYSUCKLE.

*Lonicera periclymenum.*

PLATE 4, FIG. 10.

FOR its sweet association with the largest growths of the woodland, as well as for its length—if not for its breadth—of stem, the Honeysuckle deserves to rank amongst Trees. It reaches a height sometimes—supported, it is true, by the friendly trunk of some other Tree—of as much as thirty feet, and no woodland Tree, in the quality of sweetness, can claim the possession of a greater charm than this species. Its generic scientific name of *Lonicera* is derived from the name of a German—Adam

Lonicer—and its specific name of *periclymenum* comes from two words, which mean, literally translated, 'to roll round about,' and apply to the twining habit of the species—a habit which curiously makes it take a direction from East to West. Another name often given to it—that of Woodbine—is a corruption of woodbind, and indicates its tendency to wind round neighbouring shrubs or Trees, and bind them together, as, upon increase in height, it tightens its coil. It may here be stated that in some instances it twines with such force round the stems of its Tree supports as not unfrequently to stop their growth, leaving on them—owing to its own toughness and inelasticity—the furrowed mark of its spiral course. The common name of Honeysuckle is derived from the habit of children to pick its fragrant flowers, and suck the honey from the bases of their corollas.

The leaf of the Honeysuckle—which amongst deciduous Trees is one of the earliest to start into life in the spring—is egg-shaped, obtuse or rounded at its apex. Its prominent mid-rib runs in an almost straight line in continuation of the

leaf-stalk to the leaf apex, giving origin, at somewhat wide intervals, on each side, to veins which proceed diagonally to the leaf-margin, and usually fork near their apices.

The flowers consist of clusters—spreading out, and away from a central point of attachment—of long tubular corollas, larger at their upper than at their lower ends, and, when opened at the former, funnel-shaped. They are cream-coloured, full of honey, and deliciously perfumed. So temptingly honey-stocked are they that those insects unfurnished with long probosces for reaching into the funnel-shaped mouth, and down to the base of the corolla, where the honey is stored, pierce the corolla base, and thus extract the nectar.

The Honeysuckle can easily be propagated by cuttings or by layers—both cuttings and layers being planted and made in the autumn. But, as in hedgebank and woodland there will always be found an abundance of young plants, the most certain, and withal, the best method of securing certain growth will be to get them thus rooted from their native habitats. Transplanted they

will bring into the garden the beauty and fragrance which make them conspicuous in the woods and hedges.

To the summer flowering of the Honeysuckle succeeds its autumnal wealth of red clustered berries, which, though bitter to the taste, give the charm of colour to the eye; and, as though this were not enough, there is oftentimes a season of autumnal flowering to add the mellow tints of blossom, no less than the sweetest fragrance of the woodland, to the green wealth of clustering twigs, and to the store of clustered fruit.

## 31.

### THE HAZEL.

*Corylus avellana.*

PLATE 4, FIG. 11.

REMINISCENCES of schoolboy days and the delights of 'nutting' are suggested by the mention of the Hazel. More familiar perhaps to many persons as a somewhat straggling hedgerow-shrub, it is yet a Tree in reality, for it grows to the height of more than twenty feet. Its bark when young is smooth and of a peculiarly ash-coloured hue, with speckles of brown and grey; and by this it is easy to identify it.

In its—deciduous—leaves there is a general

resemblance both in size, colour, form, and venation, to those of the Alder. The Hazel leaf is roundish,or somewhat broadly pear-shaped in form, having a wavy, somewhat irregular, and indented margin. The mid-stem continuing the leaf-stalk is, like the latter, hairy or woolly on its under side; and the principal veins which ramify diagonally and in parallel lines, from the under side of the mid-vein towards the margin, are likewise woolly. Though, as we have said, resembling the Alder leaf, the leaf of *Corylus avellana* is distinguished from the former by its pointed instead of depressed apex, and by its hollow instead of pointed base. The glutinousness of surface too, as well as the absence of the woolly covering, enables the Alder leaf to be readily distinguished from that of the Hazel. The flowers of the Hazel are borne in cylindrical catkins. The male or fertile flowers, which appear as early as February, are in colour greyish. The female flowers, following in April, are of a beautiful crimson. So soon as they have performed their office the male flowers drop from the Tree, leaving the others to develope into the familiar fruit which, seated in its green-fringed calyx, developes from

the tiniest of roundish bodies into the rich, brown edible nut.

Hazel wood, from its combined qualities of flexibility and toughness, is adapted for fishing-rods, hoops, and walking-sticks, as well as for manufacture into various articles, such as garden-seats and tables—under the general designation of 'rustic work.'

The soil best suited for the growth of this Tree is a rich reddish-brown chalky loam, which, though moist, must be well drained; for it will always be noticed by those who take their lessons in Tree culture from Nature, that it is on the hill-side that our English Hazel grows in greatest profusion and luxuriance, with greatest wealth of coyly-hiding nut clusters,—adding, by the very prominence of their position and the persistence of their foliage, to the charms of their late autumnal colouring.

## 32.

### THE BARBERRY.

*Berberis vulgaris.*

PLATE 4, FIG. 12.

MOSTLY found in the form of a shrub of not more than ten feet in height, the Barberry can claim a right to Tree honours from the circumstance that it has been known to reach a height of as much as thirty feet, and to exist for a period extending over two or three centuries. Its—deciduous—leaves are uniformly oval in shape, and beautifully serrated, the points of the serratures being extended, giving the margin an appearance of being fringed with fine hairs. The venation consists of a mid-vein,

with, on each of its sides, several wavy, somewhat irregular and forked veins extending towards the leaf margin. The twigs of this Tree are furnished near their apices with trios of thorns, which give it a spiny and characteristic appearance, and enable it to be distinguished when it has lost its foliage. Its flowers are yellow, and are borne in racemes, with numerous individual flowers, each flower having six petals and six stamens. An interesting peculiarity of these stamens is their singular sensitiveness to touch. Ordinarily, when the flower is expanded, they are spread outwards towards the outermost points of the petals, and away from the pistils; and this position, it is obvious, is not conducive to fertilization. Provision, however, for fertilization is made by the very sensitiveness of the stamens; for when the bases of the latter are touched by insects or otherwise, they spring forward as if endowed with life, and, in the act, the pollen of the anthers on their apices is shed upon the pistils, and thus fertilization is accomplished. The resulting fruit is in the form of an oblong berry, larger at the base than at its other end, and when ripe of a

red colour. Hanging in clusters, these berries add much to the beauty of the Tree.

The chief use of the wood of the Barberry is to furnish a yellow dye. In character, it is hard but brittle. Both the leaves and the fruit of this Tree —more particularly the fruit—are very acid. The latter, preserved in sugar, is agreeable to the taste and wholesome. In its green state it is sometimes gathered, preserved in vinegar, and eaten in the same way as capers.

A rapid grower and easy of cultivation, whether from seed or from its numerous suckers, the Barberry has ornamental qualifications which commend it to those who may appreciate its spreading beauty. In the woodland there is added to the reddish hue of its yellow, decaying foliage the abounding charm of its berries, clustered sometimes so numerously upon its twigs as to give a distinct feature to the landscape.

## 33.

### THE HORNBEAM.

*Carpinus betulus.*

PLATE 4, FIG. 13.

HORNBEAM, if translated into 'Hard Tree,' will at once describe the texture of the wood of this species, and give the reason for the origination of its common name. Its wood is, indeed, very close-grained, hard, horny, and tenacious. It grows to a height sometimes of seventy feet, though it is ordinarily found smaller. A deciduous Tree, with persistent retention of withered foliage on its young branches during the winter, as in the case of the Beech, it bears leaves, too, which, in their general character, bear some resemblance to

those of the Beech. The likeness is most noticeable in the form of the veining, there being a similar prominence of mid-vein and branches, and a similar regularity in the straight parallel lines of those branches. But the leaf differs from that of the Beech in being much more elongated, and in being serrated along its margin.

The flowers of the Hornbeam are yellowish in colour and are borne on cylindrical catkins, which give origin, after due fertilization, to clusters of small, ribbed nuts.

Hard clay soils are found to be the usual habitats of *Carpinus betulus*, though, from its general hardiness, it will thrive almost anywhere, provided the soil be sufficiently moist. It can be easily propagated by sowing its nuts; and if only on account of its handsomeness of leaf it deserves a place in the park and in the garden.

## 34.

### THE ACACIA.

*Robinia pseud-Acacia.*

PLATE 5, FIG. 1.—*See Frontispiece.*

DELICACY, lightness, and gracefulness of foliage distinguish this Tree above all other inhabitants of cultivated woodland. Although not a native of our island, a residence with us of nearly two hundred and fifty years gives it a claim to a place in these accounts of woodland Trees. Its specific name of *Pseud-Acacia*, or 'the false Acacia,' was given to it on account of an original, but mistaken, belief that it was the same species of Tree as *Acacia vera*, the Egyptian Acacia or Locust-Tree, supposed to

have furnished St. John with food during his sojourn in the wilderness. But though resembling the Egyptian Acacia in the form of its leaves it is otherwise a different Tree. It was first introduced into Europe by Vespasian Robin, the son of Jean Robin, a French botanist, and from this circumstance it has derived its generic name of *Robinia*. At one time it was believed that the wood of this Tree was greatly superior to Oak; and though it has lost some of its reputation as English-grown timber, it is nevertheless remarkable for peculiar hardness and toughness. It is owing partly to the somewhat rugged character of its rough-barked limbs, that its singularly light and graceful foliage has so charming an appearance. Its branches are, however, very brittle, and easily snapped by the force of high winds. In the pinnate arrangement of leaflets on their stem its leaves resemble those of the Mountain Ash, but they are otherwise very different. The leaflets of the Acacia leaf are arranged in opposite pairs along the rachis or mid-stem, are borne on short stalks, and are largest at the base of the rachis—becoming

smaller towards its apex, a single leaflet terminating the mid-stem, as in the case of the Mountain Ash. The Acacia leaflets are ovate in form, but somewhat more rounded at their apices than at their bases. From the mid-veins dividing the leaflets, along their centre, parallel veinlets branch on each side in a sort of curving sweep towards the margins. The colour of the leaves of *Robinia pseud-Acacia* is usually a bright golden green.

Its flowers, which are white, are beautifully fragrant. They do not appear until May or June, and are then borne upon the twigs in pendulous racemes, somewhat like those of the Laburnum, the fruit being borne in long pods, also somewhat like those of the Laburnum.

*Robinia pseud-Acacia* is an extremely rapid grower, reaching sometimes a height of more than thirty feet in ten years. Its roots take a horizontal direction—a habit which enables it to obtain the greatest benefit from the soil, which is always richer at the surface. This explains its rapidity of growth. Its maximum height in this country is about eighty feet,

but its rate of growth generally diminishes considerably after it has reached a height of about fifty feet, when, in an ordinary way, it has exhausted the soil in which its roots are growing.

## 35.

### THE BLACK POPLAR.

*Populus nigra.*

PLATE 5, FIG. 2.

POPLARS are all remarkable for rapidity of growth; and to this circumstance it is due in a large degree that their wood is not considered to be—relatively to many other of our woodland Trees—of much value. As the four species which we shall proceed to describe have many features in common, we shall discuss these in the present chapter, leaving for the three subsequent chapters, notices of the peculiarities which distinguish their subjects from each other and from *Populus nigra*.

A good deal of interest will naturally centre around the circumstances which are believed to have given origin to the generic name of Poplar. In Rome the Poplar was called the *Arbor populi*, or Tree of the people, either because—as was the fact—Trees of this genus were largely planted in public places, or on account of a much more ingenious supposition that the inconstancy of the people was accurately represented by the restlessness of the Poplar foliage. We may here venture to suggest that the extraordinary fecundity of the Tree may perhaps have had something to do with the generic name given to it. Although the quality of tremulousness has been especially ascribed to the Aspen, the foliage of all the species is singularly restless, often moving when there is little perceptible breeze. Hence the appropriateness of the generic appellation.

It must be generally noted that the Poplars are what are called *diœcious* Trees, or Trees whose male and female flowers are borne on different individuals of the same species—that is to say, one set of individuals bearing the male flowers, and

another the female flowers. The flowers are all borne on coloured pendulous catkins, the catkins of male Trees being especially noticeable on account of the rich hues of red or brown given to them by the colours of the anthers of the stamens. The female catkins have a cottony, downy appearance, which renders them conspicuous—the down being, in fact, the soft envelope of the seeds, to which, when the latter are ripened, it serves the purposes of wings, to bear them away to suitable soil for their development.

The softness and lightness of Poplar wood render it of little value in the arts and manufactures. It possesses qualities, however, which render it useful for particular purposes. Its whiteness and smoothness make it a desirable wood to employ for the making of floors in houses, and its comparative incombustibility, or rather the difficulty of making it catch fire, adds to its value as a material for flooring. It is generally either white or of a pale yellow colour.

Considering, however, that the foliage of the Poplar is of a character which is eminently suggestive of cheerfulness—owing to the almost per-

petual motion which it maintains in spring and summer, and until the time for the autumnal fall has arrived—it will be allowed that it gains, in this respect, what it loses in value as timber. The tremulousness of leaf in the Poplars is occasioned by a depression on each side of the footstalk just below the base of the leaf—giving increased flexibility to that part of the stalk, and by taking from the rigidity of the stem giving greater play to the motion of the breeze. Added to its rapidity of growth—the extreme ease with which it can be either raised from seed, from cuttings, by layers, and oftentimes by the numerous suckers that spring up around the trunks of some of the species—it has the further advantage that it will grow readily in and near towns. It is, therefore, a kind of Tree to be cultivated and loved by those who desire to make town life more cheerful than it is at present. Good, in the quality of richness, should be the nature of the soil in which Poplars are planted, and though they will grow almost anywhere, they prefer a moist soil, and, if possible, the proximity of the stream-side.

*Populus nigra*, the species which forms the

especial subject of this chapter, attains a height varying from fifty to about eighty feet. Its specific name of *nigra*, or black, was probably given to it not because of the particular darkness of its foliage, but to distinguish it from the whiter-foliaged *Populus alba*. A dark circle, perceptible at the centre of its trunk, has, however, been supposed by some persons to have originated its specific name, whilst, according to others, the sombre colour of its bark has suggested the appellation of *nigra*.

The leaf of the present species is readily distinguishable from those of the other three by its smooth surface, pointed apex, and serrated margin. It is, indeed, in shape, what might be called roughly triangular, or, more strictly speaking, four-sided. The venation consists of a mid-vein, and of two other principal veins, forking from it at the base of the leaf, each giving origin to somewhat wavy and forked veinlets proceeding towards the serratures in the leaf margin. The catkins, which are conspicuous on the Tree before the opening of the foliage, are produced in March and April. The male catkins are pendant in

habit, and of a dark red colour. The female catkins are round—the seed which they produce, ripened by May, being enclosed in round capsules, and beautifully covered with white cotton-like down. Another mark by which this species can be distinguished from the others is the knotty character of its trunk.

So rapid is the growth of the Black Poplar that it will oftentimes attain a height of as much as forty feet in ten years. But it is owing to this somewhat exceptional rapidity of growth that the timber of *Populus nigra* is very soft and fibrous, being of little use save for the manufacture of packing-cases. It is not a long-lived Tree, reaching its perfection in half a century, and commencing to decay after periods, beyond that age, varying from ten to thirty years. The yellow colour of its decaying leaves, taken in conjunction with their peculiar character of restlessness, add to it a noticeable feature in the mass of autumnal colouring.

## 36.

### THE GREY POPLAR.

*Populus canescens.*

PLATE 5, FIG. 3.

GREATER similarity exists between the Grey and the White Poplars than between any other of the four species described in this volume. Both have rounder leaves than *Populus nigra*, with lobed instead of indented margins, and both are, unlike the Black Poplar, covered on their under sides with white down. Both, too, are veined in a very similar manner, having a mid-vein with other two principal veins branching from it at the base of the leaf, and giving origin to wavy and forked veinlets. The distinction, as

to leaf, between the present species and *Populus alba*, is that the former is not so white on its under side as *Alba*—the downy covering having more of a greyish hue, and hence perhaps its name. The leaf of the Grey Poplar, too, is not so deeply lobed as that of the 'white' species, and it is distinctly rounder in shape. A close examination, too, of its cylindrical catkins will show that their stigmas—which are eight in number, whilst those of *Alba* are in number only four—spread away, unlike the other species, in two opposite directions, and the bracts of the fertile flowers are more deeply cut, and are also more regular. The timber of *Canescens*, too, is considered to be both harder and more durable than that of the White Poplar, though, in both, the wood is whiter than in any of the other species in the genus *Populus*.

## 37.

### THE WHITE POPLAR.

*Populus alba.*

PLATE 5, FIG. 4.

VIGOROUSNESS, as well as rapidity of growth, give an especial character to *Populus alba*. To what we have already stated as to the features which distinguish this species from the one last described, we must add that its leaves—which in their more prominently-lobed form present the most ready means of distinction between it and the 'grey' species—are very much subject to variation from their normal form. This variation does not extend merely to different individuals of the species—for, in all plants, different

conditions of growth will alter the size, and, to a certain extent, the character of the leaf in different individuals of the same species. The peculiarity of *Populus alba* is that leaves on the same Tree will vary in form, being sometimes so deeply lobed as to become palmate. The normal form will be observed in general in the earliest leaves of spring. But as the season advances, and the young shoots acquire increased vigour, their leaves become developed sometimes to more than double the size of the earlier leaves, and this development extends naturally to the indentations between the blunt-pointed lobes. The snowy whiteness of the under sides of the leaves, and of the young branches, is another conspicuous feature in this species, giving, as it does, an extremely white appearance to the whole of the foliage when it is stirred by the wind, and contrasting with the dark green hue of the smooth and shining surfaces of the upper sides of the leaves. Instead of being cylindrical, as in the case of the Grey Poplar, the female catkins in this species are ovate, and dark brown in colour, whilst the stigmas in the male catkins are in

number four instead of eight, as is the case in the catkins of the Grey Poplar. Growing in soil of the same moist character as that which all the Poplars like, *Populus alba* oftentimes will attain a height of ninety feet. It has a creeping root, from which, near the surface, it throws out abundance of suckers, and thus offers abundant opportunity for the propagation of its kind to those who may desire to have, in the dreary corners of town centres, the refreshing foliage of this enlivening Tree.

## 38.

### THE ASPEN.

*Populus tremula.*

PLATE 5, FIG. 5.

QUIVERING, even in the sultry, breezeless days of summer, the leaves of the Aspen have lent to this Tree a charm unpossessed in the same degree by any other of the inhabitants of our woodlands. And how strangely does this motion touch us with a gentle sense of pleasure! How beautifully suggestive it is, when all else is still, of the *life* of Nature! The peculiar tremulousness of the Aspen leaves is owing to their exceptional smallness, to the slenderness of their stalks, and to the exceptional thinness of the depressed upper portion of the stalks—characters

which are not so prominent in the leaves of the other species of Poplar. In their general form, and in the waviness and general character of the indentations on their margins, the leaves of *Populus tremula* resemble those of the Grey Poplar. But they are smaller and, usually, rounder; and, although they are slightly downy on their under sides when they are young, they afterwards become smooth on both sides, being of a dark shining green on their upper surfaces. Though a rapid grower and a large Tree, *Tremula* does not usually attain the size of *Alba*, rarely exceeding fifty feet in height. It has a straight stem, and when young—and until it becomes cracked by age—smooth bark. Its catkins are cylindrical and pendulous, each flower in the male catkins containing four erect stigmas. The flowers are brown in colour, and the autumnal leaves also turn to a dark brown colour, sometimes being almost black. Though the Aspen does not quite so readily grow from cuttings as the other species of Poplar which have been described, it throws up from its surface-roots suckers in sufficient abundance to admit of extensive culture.

## 39.

### THE WHITE WILLOW.

*Salix alba.*

PLATE 5, FIG. 6.

WHEN it is remembered that one of the most eminent of English botanists, who devoted a large part of a life of remarkable industry to the study of Trees, has stated that the species of the genus *Salix* might be described 'as in a state of inextricable confusion,' it will be readily admitted to be altogether beside the purpose of this volume to attempt to give a description of the various characters, real or imaginary, which have been deemed sufficiently prominent and distinct to warrant the division of

this genus into its abnormally large number of species. Our task therefore will be limited to some brief description, not of the two hundred varieties of Willow said to exist in English collections, or of the smaller number of seventy affirmed to be natives of Britain, but of two of the most familiar of British Willows, *Salix alba* and *Salix babylonica*.

The Common White Willow attains a height varying from fifty to eighty feet, according to soil and other conditions of growth. It grows rapidly and luxuriantly, reaching a height sometimes of eighty feet in twenty years, or growing at the average rate of four feet each year. Indeed, during the first half of this period the rate of growth is much more rapid, and Trees of this species have been known to attain a height of sixty feet in ten years when in suitable soil, and within reach of that in which Willows in general delight—namely, water.

Smoothness and flexibility of their branches are the peculiar characteristics of Willows, and hence their extensive use in basket manufacture, and for a multiplicity of other purposes. The leaves

of this species are lance-shaped, but tapered at both ends, having a prominent mid-vein with veinlets running thence in oblique and parallel lines to the leaf-margin. The specific name of *alba* has been suggested by the white downy or hairy covering of the surface of the leaves. This down gives to the foliage of the White Willow a singularly silky, silvery appearance. Its flowers are borne in cylindrical catkins, and are yellow in colour, the tiny resulting seeds from the female Trees—for the Willows, like the Poplars, are 'dicœcious'—being winged with soft, silky down, which thus provides for their distribution.

## 40.

### THE WEEPING WILLOW.

*Salix babylonica.*

PLATE 5, FIG. 7.

LESS in height than *Salix alba*, the character which prominently distinguishes this species is its drooping or weeping habit. It seldom grows higher than about fifty feet. Its flowers, which appear in May, are in colour of a greenish yellow, and are borne on catkins, which appear about the same time as the leaves. The latter are in form acutely lance-shaped, and are very finely serrated, the venation being similar in character to that on the leaf of *Salix alba*.

Willows naturally prefer soil that is cold and moist, although it is not often that they grow on soil that is very wet and marshy. They delight, however, in the proximity of water, and it is only in such situations that they attain their full luxuriance. They can be readily propagated both from seeds and from cuttings, and they grow, as we have seen, with great rapidity.

## 41.

### THE BIRCH.

*Betula alba.*

PLATE 5, FIG. 8.

UNIMPOSING either by its height or by its girth of stem, the Birch is, nevertheless, endowed with a gracefulness possessed in the same degree by few of our woodland Trees. Its stem does not exceed four or five feet in circumference, nor is this Tree usually found rising higher than fifty or sixty feet. But its charm—nay, its use, for there is use in beauty—is found in its delightful foliage. It is not a very enduring Tree—as life is estimated amongst Trees—for it

attains maturity in fifty years, and, though it will live oftentimes more than a century, it seldom reaches that age in healthfulness.

If we first briefly discuss the uses of the wood of the Birch, in order to dwell lingeringly on its more sensuous attractions, we shall find that it possesses value on account of its singular durability in the sense in which that word is meant to imply the power of resisting decay—a power which is possessed in a supreme degree by its bark, as proved by the fact that portions of Birch bark have been found uninjured at considerable depths in peat bogs, where it must have lain for centuries. In colour, Birch wood is white, with a shading of red. It is used for the manufacture of packing-cases, and for various purposes connected with the craft of the turner. Where the quality of imperviousness to wet is required, there Birch wood finds its greatest sphere of usefulness. The bark, wrapped round the ends of posts inserted in the ground, will preserve them from early decay, and the same power of resistance to the approach of decay is shown by the oil, which, in Russia, is extracted from Birch bark, and used in the

manufacture of that decay-resisting material—Russian leather.

The qualities of slenderness are conspicuous in the stem and branches of this Tree, and the most striking characteristic of the bark is its silvery hue, contrasted with its markings of brown and yellow, and the purplish hue of its twigs.

Come we now to its flowers and foliage. The flowers are in colour whitish, and are borne on cylindrical pendulous catkins, which appear as early oftentimes as February or March —male and female on the same Tree, the former of a light brown hue and loosely pendulous, the latter green, tinged with the crimson of their stigmas—the resulting seed, after fertilization, being in the form of minute winged nuts. Touched by the hand when ripe, the mass of seeds becomes disintegrated, each germ, however, being endowed with the power of flight. The small, acutely-pointed leaves — as poised on their delicate stalks, they lightly hang on the slender twigs which support them—are the embodiment of gracefulness. Their form is four-sided, appearing at a distance to be triangular; but what would

be in reality the straight base of a triangle, is, in the Birch leaf, rounded downwards, so that the ordinary figure of a toy kite reversed would, perhaps, give the best idea of its shape. The stalk, of sufficient length to enable the leaf to stand gracefully away from the twig, is continued, as the leafy mid-vein, to the leaf apex—straight, symmetrical and beautiful veinlets proceeding from each of its sides to the serrated margin. Careless or unobservant botanists have described the leaf-margin of the Birch leaf as being unequally indented. We emphatically dissent from this opinion. The apparent irregularity is caused by the circumstance that the edge is broken up on the two upper sides of the leaf into bays, which really divide it into lobes with acute apices. The bays are sharply and beautifully serrated, and to the acute point of each lobe runs with singular precision one of the veinlets which branch from the mid-vein.

The most delightful characteristic of the foliage of the Birch is its life,—the shining graceful leaves 'twinkling' in the sunlight with the gentlest motion of the wind. The Tree loves to

grow on upland slopes, and it is in such positions that it can best display its cheerful wealth of beauty. Its branches are sometimes curiously subject to a peculiarity of growth, which has the effect, from whatever cause, of arresting the development of its boughs, the result being a dense cluster of incipient twigs giving at a distance, the appearance as of a bird's nest ensconced amongst the branches. Rapid of growth —attaining a height oftentimes of twenty feet in the short space of a decade—and singularly hardy, the Birch is also easy of culture, and may be propagated by cuttings and by layers, as well as by seeds, if grown in soil which is light and rich.

To the green freshness of its summer foliage succeeds the beauty of autumnal colouring, when the graceful leaves—'twinkling' still at the touch of the chill autumnal breeze—charm the eye with delightful tints of scarlet, red, and yellow.

## 42.

### THE ALDER.

*Alnus glutinosa.*

PLATE 5, FIG. 9.

OF the Alder leaf we have spoken in a previous chapter. Here we need only add in connexion with its foliage, that it is of all our deciduous woodland Trees, the one which is the last to succumb to autumnal influences. Although usually seen rather as a river-side shrub than as a Tree, it attains a height sometimes of more than sixty feet when growing in the most favourable of stream-side habitats. Its rate of growth is rapid, for it will not unfrequently attain

a height of twenty-five feet in ten years. Its maximum age is about sixty years, and it produces soft wood, which is used for various purposes by the cabinet-maker and turner, more particularly for wooden household utensils. In common with all soft timber produced by Trees of rapid growth, Alder wood is not remarkable for durability. Yet this quality it nevertheless exhibits in a singular degree of excellence, when it is exposed to perpetual dampness. Hence it is largely used, and is invaluable for making the wooden piers and foundations of bridges, and for other and similar purposes.

The barren flowers of the Alder are borne on drooping catkins, and the fertile ones are oval —the seed resulting from the latter being in the form of little cones which, when ripe, drop their seeds, but themselves adhere to the twigs, remaining in this position during all the succeeding winter.

Two Celtic words, *al*—near—and *lan*—the border or edge of a river—are believed to have given rise to the generic name of the Alder; whilst the specific name of the subject of this chapter is

derived from the peculiar glutinosity of the surfaces of its leaves.

The roots of the Alder, growing in a dense fibrous mass, are remarkably succulent and spongy, and hence they have the power of attracting moisture—to such a degree, indeed, as when a number of Trees of this genus are growing together, almost to form a swamp—a curious and beautiful provision made by Nature to afford the Tree the conditions of growth which are essentual to it.

Easily grown from seed, the Alder is a very desirable Tree to cultivate in the neighbourhood of water. To our stream-sides it lends a picturesqueness which we should sadly miss had they not the deep green clustering masses of its delightful foliage.

## 43.

### THE HAWTHORN.

*Cratægus oxyacantha.*

PLATE 5, FIG. 10.

NO woodland Tree or shrub is more beautifully suggestive than the Hawthorn of that which we fondly call 'the country.' Its image is indeed so intimately interwoven with our mental pictures of the country that we never think of green fields, with their dividing hedges, without a thought of the sweet-scented Thorn, which lends to these living boundary-lines their greatest charm. Goldsmith, in the first eloquent burst of the description of his 'Sweet Auburn,' did not forget—

'The Hawthorn bush, with seats beneath the shade,
For talking age and whispering lovers made;'

and it will be admitted that there are few indeed amongst our flowering Trees or shrubs that, by the precious gift of perfume, have given so much enjoyment to mankind as this delightful Tree—for Tree it is, though mostly seen—in association with the tangled masses of our hedge-banks—as a modest shrub.

So familiar is the Hawthorn that we need not linger on details of description, but may pass on to notice some facts of interest which may not have come within the knowledge of all who know the leaf and blossom of *Cratægus oxyacantha* in its normal form.

First, then, as to size, though ordinarily, as we have said, found in shrub-form, it makes a Tree sometimes reaching a height of fifty feet, with a girth of trunk of nine feet. As a Tree, the twisting and contortion of its stem give to it a characteristic and picturesque appearance. It will live, too, sometimes to an age exceeding two or three centuries.

The normal form of the leaf of the present

species—in leaf, flower, and fruit, the Hawthorn is subject to numerous variations—is, roughly, what is called *trifid*, or three-cleft, the three clefts, or lobes, being separated by very deep incisions, which give to the leaf its distinctly three-lobed form. But the upper one of the three lobes is again divided into three smaller lobes, each lobe, or division of a lobe, throughout the leaf, being more or less deeply indented, except in the inner sides of the clefts. The venation is very regular and beautiful, a vein from the mid-vein passing to the apex of each lobe or division of the leaf, and giving origin in its course to veinlets, with reticulation over all the leafy surface. The corymbs of white, five-petalled flowers, sometimes tinged with pink, appear usually in May, giving origin to a common name of the Hawthorn blossom; and the well-known 'haws,' red-coloured or scarlet, are perfected in September, and add a distinct charm to woodland and hedgerow.

For its quality of extreme hardness the wood of the Hawthorn is valuable for many purposes for which its ordinarily small size enables it to be employed, as for tool-handles, mallets, and walk-

ing-sticks. In colour it is white, with a tinge of yellow. It has a fine grain, and is susceptible of a high polish.

Whilst its autumnal fruit adds to the beauty of the woodland, it provides in a large degree the winter sustenance of birds, and thus performs a double office of utility.

## 44.

### THE BLACKTHORN.

*Prunus spinosa.*

PLATE 5, FIG. 11.

EARLY though it is in blossoming, the white, five-petalled flowers of the Black or Sloe Thorn are absolutely devoid of fragrance. They appear usually before the leaves, and present a strange contrast to the dark-coloured bark of the Tree on which they are borne. They grow not in clusters but singly—peeping out from the thorny angles of the twigs. The leaves of the Sloe appear in little clusters, and when full-grown they are small and of a dull and dark green colour, having mid-veins giving off wavy branches to the finely and beautifully serrated leaf-margin.

The fruit is the well-known Sloe, which, though intensely sour to the taste, bears, on its ground of black, a rich purple bloom, which gives great beauty to the Tree in autumn. Though called Blackthorn, probably on account of the blackness of its bark and the sombreness of its foliage, there is no relationship between this Tree and the species last described—*Prunus spinosa*, as its scientific name implies, being allied to the Plum family.

The leaves of the Sloe have been sometimes used to adulterate tea, and the wood, though hard and susceptible of polish, is of little value except for tool handles and walking-sticks. Though ordinarily seen in the form of a shrub, the Blackthorn will sometimes attain a height of thirty feet. Its roots spread considerably, and throw up suckers at intervals, which form a dense thicket of underwood, that adds much to the wildness of our woodlands. It can be easily propagated in almost any soil either by seed or by means of its numerous suckers, and can thus be made to add to cultivated woodland the same wildness—where such a feature is desired—as it lends to its natural habitats.

## 45.

### THE BUCKTHORN.

*Rhamnus catharticus.*

PLATE 5, FIG. 12.

YELLOWISH green in flower, black in fruit, deep green in leaf, and upright in habit of growth, the Buckthorn fairly contributes to the beauty of our woodlands, where, on chalky, loamy soil it is found growing. Seldom found higher than fifteen feet—often less in height even than that—it can only claim to come within the lowlier ranks of Trees. Its four-petalled flowers are borne in clusters, and the round, black berries which constitute its cathartic fruit are four-celled and four-seeded. As a wood-

producer, it can claim no distinction; but its berries, both ripe and unripe, furnish a dye of some value. The unripe berries will produce a stain of saffron colour, the ripe ones, when gathered late in autumn, a purple dye; but gathered earlier, they furnish to the painter, when mixed with alum, his sap-green colour.

The Buckthorn leaf is oval in shape, serrated on its margin, with a prominent mid-vein, from which branch on each side three or four veins, that—instead of proceeding diagonally to the sides of the leaf—take an upward curving direction, and terminate near its upper portion.

Adding, by its decaying foliage, a hue of yellowish green to the autumnal tints of the woodland, this Tree—with its rigid thorny branches—imparts also to the autumnal landscape the lustre of its ebon fruit.

## 46.

### THE ALDER BUCKTHORN.

*Rhamnus frangula.*

PLATE 5, FIG. 13.

JUDGED by the normal Tree standard, the Alder Buckthorn will come even less within Tree limits than the species last described, for it is rarely found higher than ten feet in our woodlands—usually indeed it is not higher than six feet; but as one of its North American relatives attains a height of forty feet, we may fairly ascribe the comparative diminutiveness of our species to less favourable conditions of growth, and not on that account refuse to give it Tree honours.

Its common name of Alder Buckthorn may perhaps have been suggested by the similarity of the veining of its leaves to those of the Alder, although the even-edged leaves of *Rhamnus frangula* are in their general shape very unlike those of *Alnus glutinosa*, being oval in shape, and pointed at their apices. The flowers of the Alder Buckthorn—greatly sought after by the honey-seeking bees—are white, but are empurpled by the tints of their anthers. The succeeding cathartic berries are dark-purple in colour, and help, with the reddish green hue of the decaying leaves, to add beauty to the autumnal landscape.

## 47.

### THE DOGWOOD.

*Cornus sanguinea.*

PLATE 5, FIG. 14.

CRIMSON twigs, green leaves, white flowers, and dark-purple fruit, offer colours rarely to be found in individual Trees. Yet all these colours are possessed by the subject of this chapter. Its peculiar redness of twig has indeed earned for it its specific botanical name. It grows to a height not unfrequently of fifteen feet, opens its white, four-petalled flowers against its crimson shoots in June, ripens its berries into purple in August or September, and then gives new beauty to the woodland by tinging its decay-

ing leaves with hues of deep, rich red. Its ample, deep-green, even-edged leaves, produced in opposite pairs on its twigs, are ovate in form, but pointed at their apices, and they are prominently and beautifully veined—branch-veins curving up in rounded lines from the mid-vein towards the apex of the leaf, and minute veinlets, like delicate hairs, crossing the leafy expanse from branch-vein to branch-vein.

The fruit of the Dogwood is bitter, and, from a saying that it was not fit to be eaten even by a dog, is supposed, according to some opinions, to have arisen the common name of the genus; whilst others think that the name has been suggested by the medicinal use made for dogs of the astringent bark of this Tree. Its wood, being very hard, is used for the manufacture of skewers, and from it can be made the best charcoal.

*Cornus sanguinea* will thrive in any ordinary soil, and its superlative powers of ornamentation give it an especial claim to be admitted into cultivation in park and garden.

## 48.

### THE ELDER.

*Sambucus nigra.*

PLATE 5, FIG. 15.

KNOWN all the world over for its medicinal properties, the Elder can claim regard—from those who are not content to form opinions at second-hand, and will take the trouble to read Nature for themselves—for its beauty of leaf, its wealth of blossom, and its harvest of purple fruit. In size it can poorly compete with the Trees of the forest, and, though reaching a height sometimes of thirty feet, it is most familiar to us as a large shrub rather than as a Tree. It loves best a moist, rich soil, with

plenty of light and plenty of air. Its white flowers are borne on five-branched cymes, presenting, when fully expanded, a broad head of bloom, which changes anon into a cluster of round, purple-black berries. Though its leaves are described sometimes as being compound, and consisting of two pairs of opposite leaflets and one terminal leaflet, we shall prefer to regard this compound leaf as a twig of leaves, and to speak of each leaflet as a leaf. In shape, then, the Elder leaf is ovate, acutely pointed and sharply serrated, its mid-vein giving origin to wavy veinlets, which proceed diagonally to the leaf-margin, and are usually forked near their apices. Its colour is a dark green.

To enumerate in detail the medicinal virtues of the Elder would be beside the immediate purpose of this volume; but we may mention that its pith, its inner bark, its young buds, its fully-expanded leaves, its flowers, and its fruit, have all, in varying degrees, medicinal properties. The pleasant wine made from its berries has become a household word, and though the timber, from its great abundance of pith, might appear to lose

value, it is yet so hard that it has been used by wood-engravers in substitution of Boxwood. It is employed for the manufacture of skewers, of the toys called 'popguns,' familiar to every schoolboy —and of many articles which are produced by the art of the turner.

A rapid grower in rich, moist, and loamy soil, the Elder is, too, one of the easiest of Trees to propagate by cuttings; and, if not needed for its useful properties, it will contribute its individual beauty to the attractions of our lawns and gardens.

## 49.

### THE BOX.

*Buxus sempervirens.*

PLATE 5, FIG. 16.

FAMILIAR to everybody in the dwarf form of the old-fashioned, evergreen, garden 'edgings,' the Box, as a Tree, is much less known, probably for the reason that its distribution is local, and limited to a few districts of England. Some of the finest examples of the Box-Tree are found growing at the well-known resort of Boxhill, in Surrey, and it also grows to a large size in Buckinghamshire, Gloucestershire, Kent, and in other counties. It is believed to be indigenous to Britain, although it is here seldom

found growing to a greater height than fifteen feet, with a stem of two feet in circumference. Abroad, however, it grows frequently to double this height and circumference.

The leaves of the Box-Tree are naturally distinguished from the leaves of the more familiar dwarf shrub by their larger size. Glossy of hue, they grow in opposite pairs on their stems, are oval in shape, concave on the under side, and of thick, leathery texture. They are borne on very short stalks, the extensions of which form their raised and very prominent mid-veins. It is not easy, owing to the opacity of the substance of the leaf, to see the course of the branch-veins. But on examining a Box leaf with a magnifying glass, it will be seen that the veins, which branch in roughly and obliquely parallel lines from the mid-vein to the margin, take a wavy and somewhat irregular course, and are irregularly forked. The edges of the leaf-stalks, it will be further noticed, are slightly downy. The flowers of the Box-Tree are of a whitish, or greenish yellowish-white colour, are very small in size, and grow from the axils of the leaves, usually appearing in April or May.

The seeds, which ripen in England, are green in colour, and are usually ripened by August.

Its evergreen character, its thick, clustering foliage, and its adaptability for culture and training into all sorts of shapes, caused Box in former times—both in its dwarf and in its Tree form—to be largely used for purposes of ornamentation—which meant distorting it from its natural shape. But the hideous art of topiary, although it has not ceased to be exercised, is happily in its decadence, and will soon, it is to be hoped, die a natural death.

The Box is a slow-growing Tree, its shoots rarely increasing in length annually more than six or seven inches. It is, however, extremely hardy, and can easily be propagated, either by cuttings, by layers, or by seed, if the soil selected be rich and light and sandy in its nature; although, like most hardy plants, it will grow in almost any kind of soil. Like many other slow-growing Trees, too, it attains a great age. It possesses one quality, however, owned by no other of our woodland Trees. Boxwood is so heavy that it will sink in water—one cubic foot of it weighing, when

green, more than eighty pounds, and, when perfectly dry, nearly sixty-nine pounds. The yellow colour of Boxwood is familiar to most people, and its uses for the manufacture of toys and ornamental articles are almost innumerable. In every sense, however, its most valuable use is for wood engravings, for which it is the best of all woods. This volume is largely indebted, for instance, to Boxwood for its illustrations. How much, indeed, in the past, mankind has owed to the admirable adaptation of the Box-Tree to the art of the wood-engraver is beyond computation; for the moral, social, and intellectual influence of this beautiful art upon the nation—nay, upon the world at large—has been, and continues to be, incalculable.

## PLATE VI.

1. Cedar of Lebanon.
2. Pinaster.
3. Juniper.
4. Medlar.

## 50.

### THE CEDAR OF LEBANON.

*Cedrus libani.*

PLATE 6, FIG. 1.

RANKING second to none of our woodland Trees in the qualities of grandeur and magnificence, the Cedar of Lebanon is endowed with a picturesqueness which is unrivalled by any forest growth in the world. This beauty and magnificence of form are due to the singularly symmetrical arrangement of its spreading branches. These are disposed at such regular intervals, and in such regular stages or layers, around the fine, straight trunk of this Tree as to form a perfect gradation of foliage from its base,

at a distance of a few feet from the ground, to its summit—the whole outline of the Tree being pyramidal. The leaves, which are evergreen, short, and needle-shaped, are borne on the boughs in little branched tufts, at intervals separating them from each other.

The yellow, stamen-bearing flowers of the Cedar

are borne on short catkins. The pistil-bearing catkins are yet shorter and rounder, and when they have been fructified by the yellow pollen from the stamens, they develope into erect, large, ovate, and solitary cones (see illustration, on this page), which, when full-grown, are almost

as hard as a ball of wood, composed of scales which, unlike fir cones, are pressed close together, forming an almost even surface. The colour of the cones is purplish brown, and they contain winged seeds, which, however, do not ripen for three years. More remarkable for the magnificent spread of its branches than for its height, the Cedar of Lebanon nevertheless grows oftentimes as high as eighty feet. It was introduced into this country about two hundred years ago, and amongst the finest examples of living Trees is the one at Shobdon, which has a girth of trunk of nearly thirty feet.

Whilst discussing the subject of the Conifers, or cone-bearing Trees, of which the Cedar is one of the most magnificent, we must briefly refer to some of the peculiar characters which distinguish this order of Trees. They are amongst the giants of our woodlands all the world over, attaining a height which is excelled by no other order of Trees—a height which is singularly impressive for the reason that when growing together in the great Pine forests, the Conifers develope no side branches, the branches which spring from the

sides of the trunks, as the latter make their straight upward growth, dying off as the Trees advance in age. With few exceptions they are evergreen, with more or less needle-shaped and rigid leaves. The character of the wood in this order of Trees —the familiar 'deal'—is peculiar. It is elastic, highly resinous, and consequently, highly combustible, its fibres being arranged somewhat loosely, and in parallel lines. It is, however, very durable in use. The Trees of this order, and their fruit—the cones, or seed—vary, of course, greatly in size, according to the species. But they are mostly rapid growers—as rapidity of growth is measured amongst Trees. To attain perfection they require periods of time varying from fifty to a hundred years; but many of them, including nearly all the European species, will generally be found to commence cone-bearing at the age of twenty years. In our own woodlands the Pinaster is the Conifer which most rapidly perfects its timber; the period required for this purpose being about forty years, or at most fifty years. After half a century, however, its period of decline commences. Like all the fast-growing Trees, however, its timber is

not very valuable. In the matter of excellence, the wood of the Scotch Fir and the Larch is most esteemed.

The natural habitats of the Conifers are mountainous regions, where they are naturally subject to the force of high winds and to exposure to cold; and Nature marvellously adapts them to the situations they occupy. Growing oftentimes on shallow soil, or rocky mountain sides, the horizontal direction which their roots habitually take enables them to secure a hold upon a comparatively large extent of ground. Like most roots, too, which grow horizontally, Pine-Tree roots are frequently exposed above the surface of the ground, and they thus acquire a hardness which enables them the better to support their tall stems, and to resist the force of storms. Were they furnished all the way up their trunks with branches, a surface would be presented to the wind which would enable it to exercise enormous force, the result of which would be certain upheaval. But the trunks of the mountain and rock-loving Pines are bared of encumbering branches, and even upon their heads of

foliage the force of the wind has little effect, because it can pass between the needle-shaped leaves of these Trees. And not last amongst the wise provisions of Nature in adapting the Conifers to their rugged habitats is the form and protective covering of the seeds. The seed-cases are the well-known cones, and these, impervious to water, are formed with wonderful strength, enabling them to fall unharmed—when the fit season has arrived—from the great height of the Pine-heads, even on to rocks below.

Hardy, like most of the Conifers, the Cedar will thrive in almost any soil, preferring, however, a soil cold at the bottom, especially if the roots are within reach of water, and moist near the surface. It also requires for the perfection of its timber, a clear and dry atmosphere.

Cedar wood is sweet-scented and has a reddish tinge; but in the order of excellence amongst Conifers, it can take only a second rank. Yet for the beauty and magnificence of its spreading branches, this noble Tree, whose reproduction from seed is extremely easy, should find a place in any park or garden for which it is suitable.

## 51.

### THE PINASTER.

*Pinus pinaster.*

PLATE 6, FIG. 2.

AMONGST the Conifers in general we have seen that roots take a horizontal direction — comparatively few of them indeed being furnished very prominently with what are called 'tap-roots'—or thick root-stems, which descend perpendicularly into the ground. The Pinaster is an exception to this general mode of growth, for it has a tap-root larger than that of any other European Conifer, and its mode of root-growth is perpendicular. Its horizontal roots are, however, on the other hand, less vigorous than those of others of

its kind, and it is owing to this circumstance that the weight of its foliage often bends it to one side. It is a rapid grower, thriving well in sandy soils near the sea, whose influence—injurious to many other Trees—it can withstand unharmed. Introduced into this country in the year 1596 it is sometimes found amongst us at a height of as much as eighty feet, with a trunk four feet in diameter. Its grooved, rigid, needle-shaped leaves, which are of considerable length, measuring frequently more than eight inches, grow in pairs—each pair mounted together in a short scaly sheath. Its cones (see illustration on page 323), when full grown, average in height about four or five inches, with somewhat less than half that width at their widest part.

In ten years from first planting the seed, the Pinaster or Cluster Pine—so called from its cones being ordinarily produced in clusters—will, oftentimes, attain a height of as much as twelve feet, and in twenty years as much as thirty feet. Its timber is soft, and put chiefly to inferior uses, such as for packing cases, for inferior kinds of carpentry, and for fire-wood. From the growing

Tree, however, may be obtained in large quantities, lamp black, oil of turpentine, pitch, resin, and tar. A curious use to which the living Tree is put, is to bind together shifting sand banks on the sea-shore; for, disliking any soil of

a chalky nature, and loving to grow in dry sand, especially where there is a considerable depth of it, it has been found an admirable Tree for planting on sandy wastes, fit for no other species of vegetation or Tree growth.

## 52.

### THE JUNIPER.

*Juniperus communis.*

PLATE 6, FIG. 3.

NO claim to magnificence of growth can be established for the subject of the present chapter. Indeed, its claim to be considered a Tree at all may be disputed by some persons; for in our woodlands it is seldom that *Juniperus communis* reaches a height of more than fifteen feet. Yet specimens of this species have been found growing of a height that will warrant its inclusion here. Its leaves, pointed and bristle-like, are mostly borne in little groups of three upon its somewhat bushy branches. Its

flowers are of a whitish-yellow colour; and its fruit (shown in the illustration on this page) is in the form of purple or purplish-black and fleshy berries. The Juniper is easily grown on sandy soil, and can be propagated either by seed, by

cuttings, or by layers. Its trunk or stem is usually too small to produce any appreciable quantity of wood. But it is aromatic, of a yellowish-brown colour, very durable, finely veined, and susceptible of a high polish, and is useful and

desirable for the manufacture of small articles. The berries of the Tree are edible, and have in consequence been put to various uses, such as for preserves, as a substitute for coffee, and for flavouring gin.

*Juniperus communis* is not a fast grower, making a growth of little more, on an average, than six inches each year, and growing even slower than that after it has reached a height of about seven feet.

## 53.

### THE MEDLAR.

*Mespilus germanica.*

PLATE 6, FIG. 4.

CULTIVATED for its fruit—which, strange to say, it not eatable until it is in a state of semi-decay—the Common Medlar is a Tree of modest dimensions. Its leaves are entire at their edges, and of a pointed oval shape, furnished on each side of their midveins with a system of branching, wavy, forked veinlets, which run towards the leaf margins. The leaves are soft and downy on their under sides; the flowers are white, have five petals, and are borne singly on the branches. The fruit, which usually ripens about

October or November, is, as is pretty well known, of a rather dark brown colour. It is five-celled and five-seeded. *Mespilus germanica* can be grafted successfully either upon the Hawthorn, the Wild Pear, or the Quince. The Tree will grow in almost any kind of soil which is not too moist.

The Medlar has not a wide distribution throughout English woodlands, being found—and that very sparingly—in a wild state in only two or three counties, including, it is believed, Chester, Kent, Surrey, and Sussex. Its autumnal leaves have hues of brown and yellow.

## PLATE VII.

1. Silver Fir.
2. Yew.
3. Tamarisk.

## 54

### THE SILVER FIR.

*Picea pectinata.*

PLATE 7, FIG. 1.

INTRODUCED into this country in the year 1603, the Silver Fir possesses high value as a timber Tree, whilst its great height, when full grown, and its pyramidal form, made up of numerous tiers of spreading branches, give it a very handsome appearance. The peculiarity to which it owes its common name adds largely to the striking and picturesque appearance of *Picea pectinata*. Its leaves are short—averaging from half an inch to an inch in length—stiff and pointed, concave on their under side, and

furnished with prominent mid-ribs. On their under sides, along on each side of their mid-ribs, is a line of silvery white which gives to the foliage, which is frequently turned up, showing the under sides of the leaves, a gloss as of silver, very conspicuous when the sun is shining, and even at night when subject to the light of the moon. Instead of being borne equally all around the stems, the leaves are clustered along on two of its sides only, thus giving a flat or depressed appearance to the twigs. The cones of the Silver Fir (see illustration on page 333) are cylindrical in shape, and it is characteristic of the Tree that they are borne erect on the twigs, and not pendulous, as in some other species of Conifers.

*Picea pectinata* attains a height not unfrequently of a hundred feet, and it has been known —though the instances are not numerous—to grow a hundred and fifty feet high. There is one standing at Longleat a hundred and twenty-five feet high. Less hardy, however, than some of the Conifers, the Silver Fir prefers a situation at a lower elevation than that suitable for most of its kind, and a soil of some depth, rich and loamy

in composition. It is a curious fact that, unlike the majority of Trees, its growth is less rapid when it is young than after it has attained the age of about ten years. Its timber, which is

whitish in colour and elastic, with an irregular grain, is employed for almost every kind of carpentry, whilst the living Tree furnishes an abundance of resinous products.

## 55.

### THE YEW.

*Taxus baccata.*

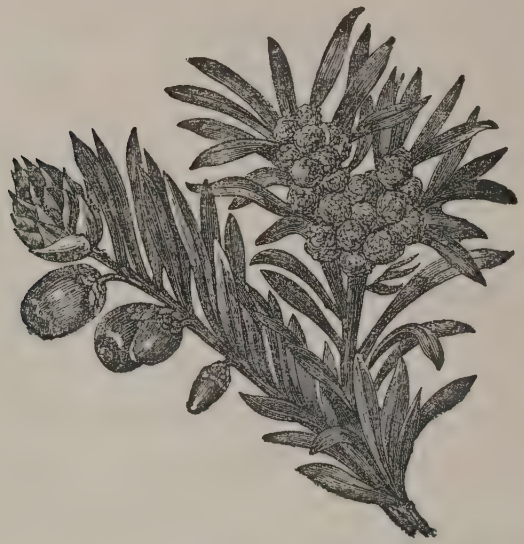
PLATE 7, FIG. 2.

SLOWNESS of growth and sombreness of foliage are the persistent characteristics of the Yew. It does not, under any circumstances, become a tall Tree, its maximum height being only about forty feet, whilst it is frequently much lower than that. But it acquires oftentimes an enormous girth, instances of Yews of twenty-four feet in circumference being not uncommon, whilst instances of Yews of thirty, forty, fifty, and even more feet in girth have been recorded. The evergreen leaves of this Tree,

which are poisonous, are produced along the twigs in two opposite and crowded rows. They are of a sombre green colour, shining, oblong, pointed, opaque, concave on their under sides, with a conspicuous mid-stem, and somewhat less than an inch in length. The male and female flowers respectively are produced on different Trees, growing on the under side of the twigs. The male flowers are small in size, and are clustered on the twigs in the form of scaly, membranous buds. The female flowers are somewhat like tiny acorns in appearance, with, however, red fleshy cups, enclosing seeds in the form of nuts, which are uncovered at the tops, like acorns protruding from their cups, and are edible. The accompanying illustration (page 336) exhibits two sprays of Yew, one showing its flowers, and the other its fruit.

Slow of growth, continuing ordinarily to increase until it has reached the age of a hundred years, the Yew is a Tree of great longevity, often existing during several centuries. Like the Pines, it loses its side branches when it grows in large masses.

Owing to its extreme slowness of growth, its wood, as might naturally be expected, is of considerable value. It is compact, yet elastic, flexible, and extremely hard, having, moreover, a singularly close grain. Its colour is either a deep



brown or an orange red. Its slowness of growth causes it to produce very thin annual layers of wood, and it is this circumstance which occasions the fineness and compactness of grain and the hardness of the timber. In a piece of Yew no

more than twenty inches in diameter, there have been counted the extremely large number of two hundred and eighty annual layers, exhibiting a growth in the same number of years of only five feet in circumference. In olden times the Yew furnished to archers their best bows, and though to a large extent our British Yew-Tree wood is now disused for that purpose, it furnishes some of the best and most valuable of native timber for the purposes of the cabinet-maker.

The Yew, however, though a slow grower, is comparatively easy of cultivation, and it may be propagated either by layers or by seed, if planted in a moist and clayish or heavy loam soil, and in a sheltered or shady position.

## 56.

### THE TAMARISK.

*Tamarix gallica.*

PLATE 7, FIG. 3.

GROWING almost exclusively in the south of England, and rarely even there exceeding the size of a shrub ten feet in height, *Tamarix gallica* is not very well known. That it belongs to the Tree family is, however, proved by the fact that it sometimes attains a height of as much as thirty feet, with a trunk of considerable thickness. It prefers a deep, sandy soil and the presence of water, and is frequently found in proximity to the sea. It is partially evergreen, its branches are of a purplish hue, and its leaves

which are very minute and pointed, are borne alternately on thread-like sprays—which they clasp—placed along small tapering twigs. The little pink flowers grow at the extremities of the sprays, are thickly clustered, and have the appearance, in the mass, of flower spikes. The whole Tree when in bloom has—leaf and flower—a very feathery look. The small seeds are tufted with hairs, which start from their apices. Both leaves and flowers are bitter to the taste, and have been sometimes used as a tonic, and for communicating a bitter flavour to beer.

The Tamarisk can be readily propagated by cuttings, which should be planted in a position facing to the north; and its peculiarity of habit is that it prefers a position facing the sea, and will thrive better when exposed to the influence of the sea breeze.

## 57.

### THE STONE PINE.

*Pinus pinea.*

PLATE 8, FIG. 1.

HIGHER though it is in Greece and Italy than in Britain, the Stone Pine is amongst the least imposing of coniferous Trees. With us, it is often little more than a tall shrub, although it sometimes grows to a height of thirty feet; but in Greece it is frequently as high as sixty feet. It has a trunk, clear of branches in its lower part, but a spreading head which has suggested for it the common name of the Umbrella Pine. The evergreen leaves of this species are similar to those of the Pinaster, but are not so long. They

## PLATE VIII.

1. Stone Pine.
2. Larch.
3. Holly.
4. Scotch Fir.

grow in twos, mounted in scaly sheaths, like those of the Pinaster, are dark green in colour, pointed, and needle-shaped, but grooved throughout their entire length. The cones are rounder and lighter in colour than those of the Pinaster, usually about five or six inches in length, and about four inches across at their widest part. The seeds enclosed within the cone are somewhat of the shape of the kernel of a hazel nut, but longer, and possess a flavour which is not disagreeable to the taste. Their length is, with their investing wings, about one inch; without the wings they are less by about a quarter of an inch.

Deep, dry and sandy soil, and a sheltered situation, are conditions of growth which suit this Tree; but, owing to the fact that, like the Pinaster, and unlike Pines in general, it is furnished with a long tap-root, which penetrates deeply into the soil, it is necessary to exercise care in the transplantation of young Trees to secure the removal of the whole of the root.

## 58.

### THE LARCH.

*Larix europœa.*

PLATE 8, FIG. 2.

EXTENDING its range over the mountain districts of central Europe, the common Larch produces timber, the value of which is excelled by that of scarcely any other Pine wood in the world. In the quality of endurance it has, indeed, been affirmed that it is so pre-eminent that it will last four times longer than the wood of any other species of Conifer. Its colour is a reddish brown; its grain is compact; it will bear, without injury, exposure to the effects of the weather—even improving as it becomes older when employed

in naval architecture, for which it is in great request. For all kinds of carpentry and joinery; for railway sleepers, and for use in any capacity where it is likely to be exposed to alternate moisture and heat, it is invaluable. Yet the Larch will grow well upon almost any soil, including land in barren mountainous regions—a fact which shows in a remarkable manner how bountiful is Nature in providing for the wants of man, by making barren hills and desert places minister to his necessities.

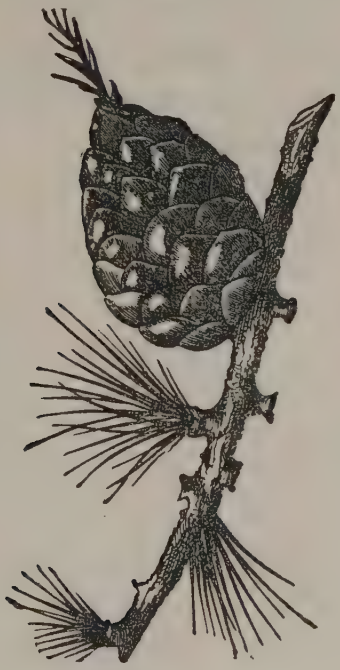
The Larch is—unlike the majority of the Conifers—a deciduous Tree, and by its habit of unclothing in the winter, gives an opportunity to those—and we trust that their name is legion—who love to study the winter guise of the inhabitants of our woodlands, to see in full perfection, without its covering of leaves, the pyramidal form of one of the cone-bearers.

From the living Tree is extracted the most valuable of all turpentine. This resinous product accumulates in cavities in certain parts of the Larch, whence it is extracted by means of augurs, and an arrangement of wooden tubes to convey

from the Tree to the receptacle prepared for it, its valuable juice. A species of 'manna' too, which is found in white grains on the tender skin of the young twigs, is collected from this Tree.

Introduced into Britain in the year 1629, *Larix europæa* will attain in this country a height of a hundred feet. In habit of growth it is, as we have seen, pyramidal, its branches extending horizontally from its stem, widest near the ground, and diminishing upwards, thus exhibiting a cone-shaped appearance. Its branches, however, droop at their edges, giving a feathery and graceful look to the Tree. Its leaves, instead of being rigid, are soft, and of a light green colour. They are produced in what are called *fascicles*, or little bundles, alternately along the stems of the twigs, and are usually about an inch in length. They have, indeed, an appearance which may not inappropriately be likened to little tufts of grass placed at intervals along the twigs. The flowers of the Larch are produced early in the spring. Its cones are borne erect on the twigs, and are ovate in form, from an inch to an inch and a quarter in length. The accompanying illustration, on page 347, shows

the natural size of a Larch cone and twig, and the natural position of the former on the twig.



The wood of the Larch is usually perfected when the Tree is forty years of age—a period less by one-half than that required by the Scotch Fir, and less by one-third than that required by *Pinus pinaster*

for the same purpose. It is, too, a rapid grower, for in ten years from planting a seed a Larch of twenty-five feet in height will often be produced, whilst in fifty years the Tree will attain almost its ordinary maximum growth, namely, eighty-feet. It often lives to a great age—not unfrequently as long as two centuries.

## 59.

### THE HOLLY.

*Ilex aquifolium.*

PLATE 8, FIG. 3.

CORRUPTION of the word 'holy' is believed by some botanical writers to have given origin to the common name of *Ilex aquifolium*, for the reason that it was in former times—as it is now—largely employed for purposes of decoration at the holy season of Christmas. The generic scientific name *Ilex* was suggested on account of the likeness of its leaves to those of *Quercus ilex*. No shrub or Tree is more familiar than this beautiful species. Though ordinarily seen as a more or

less tall garden shrub, it is fairly entitled to take rank as a Tree, growing in our woodlands oftentimes to a height of twenty or thirty feet, and—as we have seen it in the New Forest—with a girth of more than nine feet. When planted as a border, it makes a thicket untouched by insects, and impenetrable even to birds.

On old Trees the upper leaves of the Holly are often entire and unprovided with the spiny points which are so generally characteristic of the leaves of this species. But the spiny leaf of *Ilex aquifolium* is a thing of beauty, whether we look at it glistening under the rays of the sun, sparkling with the added brilliancy of rain drops, or merely hold it in our hand to examine with more minuteness its form and colouring. Specially shall we have occasion to admire it if we look at it as 'only a leaf,' and not when it is—in clustering association with ten thousand of its companions—lighting up the dark recesses of some wood. Dark green above, lighter underneath, oblong in shape, and curiously contorted—its edge bent and twisted into bays, furnished with promontories in the form of sharp spines—these are

racters prominently displayed and noticed even by the most casual observer. But the loving student of Nature will not be satisfied with such a cursory examination. He will take the Holly leaf in his hand, and will notice how beautifully its dark, glossy-green surface is relieved by the line of the traversing mid-vein and by the delicate lines of veinlets which diverge on the right and on the left diagonally towards the leaf margin. He will notice, too, the further relief afforded to the deep green of the surface of the leaf by the pale green of its wavy edge; now shown as the spine-bounded bays twist upwards, now hidden as they bend downwards. It is only, however, when held against a strong light that the venation of the leaf can be properly seen. It will then be found that the branch veins are beautifully forked near their apices with a symmetry equalled by few other leaves in the whole of the vegetable kingdom.

The flowers of the Holly appear in May, and are white. The fruit—in ruby clusters—ripe in September, and, persistent all the winter, it is unnecessary to describe. It remains but to speak of

the use of this beautiful Tree in so far as its usefulness stands apart from its mere beauty. Its wood is singularly white. It is close in texture, is hard, possesses a fine grain, and is susceptible of a high polish. On account of these valuable qualities, it is made use of for a great variety of purposes by the cabinet-maker, the joiner, and the turner. From its bark bird-lime can be manufactured, and its berries furnish welcome food to many of our birds, though they are unfit for the food of human beings, and are even poisonous to them.

Extremely hardy, the Holly will grow upon almost any soil, though it prefers a rich sandy loam. For autumnal hues it has yellow tints on its glossy leaves to contrast with its wealth of scarlet fruit.

## 60.

### THE SCOTCH FIR.

*Pinus sylvestris.*

PLATE 8, FIG. 4.

THE Scotch Fir, as *Pinus sylvestris* is commonly called, is the only one amongst our British Conifers indigenous to this island; and proof of its being indigenous is furnished by its presence in peat bogs in certain parts of the country. For its timber it is valued beyond all the species of Pine growing in Europe. It grows to a height varying according to circumstances, but frequently as much as a hundred feet, and with a corresponding girth. Its great habitats are the Highlands of Scotland, and hence

its popular name, although it should be more correctly described as the Scotch Pine.

Here it may be useful to point out the principal botanical distinctions which have suggested different generic names for the Conifers represented in the descriptions in this volume. The genus *Pinus*, of which we describe, in addition to the subject of this chapter, *Pinaster* (or Cluster Pine) and *Pinea* (or Stone Pine), includes Conifers which have their male flowers in grouped or clustered catkins, their pollen enclosed in two cells, their carpels—answering to the scales of the cones—thickened at the tips, and their leaves mounted in sheaths, containing two or more. The genus *Abies*, of which we describe the species *Excelsa* (or Spruce Fir), possesses the same characters as those of *Pinus*, with the exception that the cones droop, and the leaves are solitary and not grouped in sheaths. The genus *Picea*, of which we describe the species *Pectinata* (or Silver Fir), is distinguished from *Pinus* in the carpels not being thickened at the tips, from *Abies* in having the cones erect, and from both these genera in having the leaves arranged in two

rows on opposite sides of the twigs. The genus *Larix*, of which we describe the species *Europæa* (or Larch), is like *Abies* in some respects, but is known from it by its leaves being deciduous and disposed in alternate groups or clusters on the twigs, as well as in having its cones erect, instead of pendulous. And, finally, the genus *Cedrus*, of which we describe the species *Libani* (or Cedar of Lebanon), whilst agreeing in some of its features with *Larix* (the mere form of the cones is not taken into consideration in these distinctions), differs from that genus in having its leaves evergreen, and its anthers—the pollen-carrying organs of the stamens—crested.

Returning now to the subject of this chapter, it must be stated that though, when under cultivation, or when growing alone, the Scotch Pine retains its side branches, which give to the Tree the pyramidal Fir shape, it assumes in its native mountain wilds, in Scotland and elsewhere, the peculiar character of Pine growth, namely, a long straight stem, rising for a considerable distance from the ground, and a crowning mass of foliage far up aloft. It is believed that the prevention of

a free circulation of air around the lower parts of the trunks of the Trees in the dense Pine forests is prejudicial to the development of side branches. They are formed, as in other Trees, at first, but gradually decay and fall off as the trunk soars upwards.

The leaves of *Pinus sylvestris* are needle-shaped and rigid in texture, varying from an inch and a half to nearly three inches in length. They are borne in twos, in scaly sheaths, are concave or grooved on one side, and slightly twisted, or waved, in appearance. Their colour is a bluish green, and this hue, contrasting with the dark red colour of the trunk and stems, gives to the Tree a striking and impressive appearance. The flowers of the Scotch Fir are produced usually in May or June, and are succeeded in the female catkins by cones of from two to three inches in length, and from an inch to nearly an inch and a half in breadth at their widest parts.

Of the value of the red timber of *Pinus sylvestris*, we have already spoken. It is admirable for every purpose for which Pine wood is used; it is comparatively free from knots, and

when these exist they are easily worked, and do not so readily drop out of the boards in which they are left, as is the case with the knots of Pine wood in general. For the quality of durability it is equal, when kept dry, to oak. It is light, yet stiff, straight, and strong, and is the most useful for all kinds of house carpentry ; as, for instance, for girders, for joists, and for rafters. It is very useful, too, in naval architecture. The living Pine produces an abundance of turpentine, and tar also is manufactured from its wood.

Scotch Pines live to a great age, examples having been recorded of individual Trees having existed for nearly two centuries and a half. One of their most remarkable characteristics is the readiness with which they will grow on the driest and poorest of soils, such as the *débris* of granite rock ; and, like the other individuals of their genus, they prefer the most exposed situations, where they add to the wild and solitary regions in which they grow—usurping the ground, as is the habit of their kind, to the exclusion of all other vegetation—a singularly impressive aspect of grandeur

## 61.

### THE SPRUCE FIR.

*Abies excelsa.*

Fig. on Page 542.

TIGHER in growth when found on its native mountains than any of the species of Conifer described in the preceding chapter, deriving from this habit the name of 'The Lofty Fir,' *Abies excelsa* is, nevertheless, not so highly esteemed for its timber as either *Pinus sylvestris* or *Larix Europæa*. The wood of the Spruce Fir is, however, light and elastic—white in colour, of a fine grain, and susceptible of a high polish. It is useful for picture-frames, on account of the readiness with which it can be gilded. But, commonly, it is used for making ladders, the masts of

small vessels, oars, scaffolding poles and spars, as well as for flooring rooms, for the cases of musical instruments, and for sundry purposes by cabinet-makers and carpenters. The living Tree, which furnishes from its young shoots the material for Spruce Beer, and an abundance of resin, was introduced into this country about the year 1548. It is a rapid grower, but thrives with greatest luxuriance in deep, loamy soil, in a moist and sheltered situation, where it will retain the characteristic pyramidal form of cultivated Conifers, but will produce branches which, though horizontal in general direction, droop from their extreme edges, and often 'feather' to the ground. In its Pine-like aspect in the mountain regions of Norway and elsewhere, it loses its side branches, and developes its head to a height of sometimes as much as a hundred and fifty feet above the soil. Even in this country there are specimens of *Abies excelsa* a hundred and thirty feet in height, and sixteen feet in circumference. Its short leaves, following one of the characters peculiar to the genus *Abies*, are produced singly on the twigs. They are not confined, however, to any particular

sides, but are scattered pretty evenly over their whole surface. It produces its flowers in May, but does not perfect its cones until the following year.

The cones of the Spruce Fir (a figure of one, with

a few leaves, is given on this page), are much longer than they are broad, being usually from five to seven inches in length, but not more than two inches in breadth at their widest part. They hang from the twigs on which they grow, and from out of them fall winged seeds in the due season of ripening.

# INDEX.


*Abies excelsa*, 354, 358–60
Acacia, 264–7
*Acacia vera*, 264
*Acer campestre*, 202–5
*Acer pseudo-platanus*, 185–9, 203
*Æsculus hippocastanum*, 173–8
Alburnum, 82
Alder, 257, 291–3
*Alnus glutinosa*, 291–3
Apple, 245–8
*Arbor populi*, 269
Arbutus, 206–9
*Arbutus unedo*, 206–9
Ash, 133–8
Aspen, 269, 279–80
Assimilation, 39, 51
Atmospheric food, 40, 73–4
Autumn, 34, 103
*Axis* of plant, 26

Barberry, 259–61
Beauty, 95–104. *Illus.* 93, 97, 101, 105
Beech, 149–55, 262–3
*Berberis vulgaris*, 259–61
*Betula alba*, 286–90
Birch, 286–90
Bird cherry, 239–41
Blackthorn, 298–99
Box, 309–12
Breathing pores, 57, 74
Buckthorn, 300–1
„ Alder, 302–3
*Buxus sempervirens*, 309–12

Capillary attraction, 39, 66
*Carpinus betulus*, 262–3
*Castanea vesca*, 166–72
Cedar of Lebanon, 315–20. Cone (*Illus.*), 316
*Cedrus libani*, 315–20
Cellular framework, 52, 53, 56, 82
*Cerasus padus*, 239–41
„ *sylvestris*, 229–32
„ *vulgaris*, 233–4
Cherry, 229–32, 233–4
Chestnut, 25, 166–72
Chlorophyll, 54
Chromophyll, 55
Colour, Origin of, 54, 55, 56
*Cornus sanguinea*, 304–5
*Corylus avellana*, 256–8
*Cratægus oxyacantha*, 294–7

Development, 61–76
Dogwood, 304–5

Early growth, 31–41. *Illus.*, 31, 35
Elder, 158, 306–8
Elms, 139–45
Endogens and exogens, 68, 71
*Euonymus europæus*, 218–20

*Fagus sylvatica*, 149–55
Fertilization, 22, 26, 76
*Ficus sycomorus*, 186
Food of Trees, 49, 50, 51
*Fraxinus excelsior*, 133–8, 214

Galls and gall-flies, 121–2, 123
Germination, 28, 33, 34, 37, 49
Germ, The Tree, 21–8, 33
Glossiness, Cause of, 56
Guelder Rose, 223–5

Hawthorn, 294–7
Hazel, 256–8
*Hedera helix*, 162–5
Holly, 129–30, 154, 349–52
Honeysuckle, 252–5
Hornbeam, 262–3
Horse-chestnut, 173–8

Ilex, 128–32
*Ilex aquifolium*, 130, 349–52
*Integuments*, 23, 24, 26, 33, 37
Ivy, 162–5

*Juglans regia*, 179–82
Juniper, 324–6. *Illus.*, 325
*Juniperus communis*, 324–6

Larch, 344–8. Cone (*Illus.*), 347
*Larix europæa*, 344–8, 353
*Liber*, 71, 82
Life of a Tree, The, 7–105. *Illus.*, 5, 13, 17
*Ligustrum vulgare*, 210–13
Lime, 70, 156–61
Locust-Tree, 264
*Lonicera periclymenum*, 252–5

Maple, 202–5
Medlar, 327–8
Medullary rays, 82
*Mespilus germanica*, 327–8
*Micropyle*, 26, 37
Mistletoe, 116, 248
Mountain Ash, 214–17, 265
Mulberry Fig, 186

Oak 'apples,' 121
„ Evergreen, 128–32
„ Flat-leaved, 125–7
„ 'galls,' 121
„ names, 114
„ 'spangles,' 123, 203
„ Wavy-leaved, 111–24

Pear, 235–8, 246, 247
Perfection, 81–9. *Illus.*, 77, 83, 87
*Picea pectinata*, 331–3, 354
Pinaster, 318, 321–3. Cones (*Illus.*), 323
*Pinus pinaster*, 321–3, 347
„ *pinea*, 340–3, 354
„ *sylvestris*, 353–7

Pith, 70, 82
Planes, 190–8, 201, 203
*Platanus occidentalis*, 190–7, 198, 200
„ *orientalis*, 198–201
Plates I. to VIII., 110, 167, 184, 222. *Front.* 314, 330, 341
*Plumule*, 24, 25, 37, 38, 39, 68
Poplars, 268–80
*Populus alba*, 272, 275, 276–8, 280
„ *canescens*, 274–5
„ *nigra*, 268–73, 274
„ *tremula*, 279–80
Privet, 210–13
Protoplasm, 53, 54, 56, 63, 64, 65
*Prunus spinosa*, 298–9
*Pyrus aria*, 249–51
„ *aucuparia*, 214–17
„ *communis*, 235–8
„ *malus*, 245–8
„ *torminalis*, 242–4

*Quercus ilex*, 128–32, 349
„ *pedunculata*, 111–24
„ *sessiliflora*, 125–7, 169

*Radicle*, 24, 25, 37, 38
*Rhamnus catharticus*, 300–1
„ *frangula*, 302–3
*Robinia pseud-acacia*, 264–7
Roots, Functions of, 39, 41, 56, 57, 66, 67, 68, 85, 86
„ Upheaving power of, 68

*Salix alba*, 281–3, 284
„ *babylonica*, 282, 284–5
*Sambucus nigra*, 306–8
Sap-wood, 82
Scotch Fir, 353–7
Seeds, Distribution of, 27
„ Endowment of, 26, 27
„ Vitality of, 27, 28
Silver Fir, 331–3. Cones (*Illus.*), 333
Spindle Tree, 218–20
Spiral threads, 54
Spring, 34, 40, 99, 100
Spruce Fir, 354, 358–60. Cone (*Illus.*), 360
*Stomata*, 57
Stone Pine, 340–3, 354
Structure, 47–57. *Illus.*, 45
Summer, 34, 100, 103
Sunlight, Action of, 56, 73, 74
Sycamore, 185–9, 203
Sylvan landscapes, 96

Tamarisk, 338–9
*Tamarix gallica*, 338–9
*Taxus baccata*, 334–7
*Tegmen*, 23
Temperature of Trees, 49, 50
*Testa*, 23
*Tilia europæa*, 156–61
Tissues, 53, 54, 70, 71, 73

*Ulmus campestris*, 139–45
„ *montana*, 146–8

*Viburnum lantana*, 226–8
„ *opulus*, 223–5
Vitality of plants, 10

Walnut, 179–82
Wayfaring Tree, 226–8
White Beam, 249–51
Wild service Tree, 242–4
Willows, 281–5
Winter, 34, 103, 104
Wood, Formation of, 67, 82, 85
Wych Elm, 146–8

Yew, 334–7. Fruit (*Illus.*), 336
Yule-log, 115

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